A DIFFERENTIAL RESPONSE TO BEHAVIORAL OBJECTIVES ON STUDENT ACHIEVEMENT IN A SEX EDUCATION INSTRUCTIONAL SYSTEM

BY

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Abstract of Dissertation Presented to the Graduate Council of the
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The central purpose of this study was to examine the differences in learning achievement attributable to the differential placement of behavioral objectives in textual material. An additional purpose of the study was to examine the interaction between certain learner characteristics and the various behavioral objectives treatments.

Instructional materials on birth control and sexual anatomy were modified by placing behavioral objectives either before, within, or after written textual material. It was expected that these variations in treatment conditions would influence the acquisition of both relevant and incidental information contained in the textual material.

One hundred and ten subjects were randomly assigned to one of four treatment groups or a control group. A posttest only, control group design was used. Subjects were given aptitude tests representing verbal and memory abilities in addition to the treatment materials and posttest criterion measures. Posttest measures included performance on questions relevant to the behavioral objectives and performance on questions which were not relevant to the objectives but could be answered from the textual material (incidental questions).

It was anticipated that learner aptitudes would differentially affect learner performances under different treatment conditions. Support for proposed research hypotheses was dependent on the effectiveness of behavioral objectives as devices to elicit attending behaviors from students as they read textual material. Analyses of the data did not reveal significant main effects or significant interations between aptitude variables and instructional treatments. The research hypotheses were therefore not supported. Possible reasons for the ineffectiveness of the various behavioral objectives treatments included:

1. The objectives, rather than acting to focus students' attention on relevant information may have interfered with their attending efforts.
2. The nature of the materials in this study may have been very stimulating. Therefore, it is possible that all parts of the material were given equal attention regardless of the presence or placement of written behavioral objectives within the material.
3. Students may not have fully understood how to use the objectives as a studying device because of the possible inadequacy of a brief training program conducted prior to the experiment which was designed to orient students to objectives.
4. Students who participated in the study have been exposed to a relatively unstructured learning environment and therefore have developed personalized learning styles. These students may have disregarded the utilization of a learning strategy made possible with objectives in favor of their own personalized learning styles.

CHAPTER I

THE PROBLEM

Statement of Purpose

The central purpose of this study was to examine the differences in learning achievement attributable to instructional treatments in which the location of behavioral objectives was varied in relation to the text materials. An additional purpose of the study was to examine the interactions between certain learner aptitudes and the behavioral objectives treatments.

Instructional materials were modified by placing behavioral objectives either before, within, or after written material. It was expected that these variations in treatment conditions would differentially influence the acquisition of both relevant and incidental information contained in the textual material. Furthermore, it was anticipated that learner aptitudes would differentially affect learner performance under different conditions.

Background to the Problem

The history of behavioral objectives has been briefly reviewed by Eisner, (1967). His review described the interest, development and utilization of objectives since the beginning of the 20th Century. Beginning in the twenties and continuing into the sixties, educators including Charters (1923), Tyler (1934), Mager (1962), and Popham (1969) have been among those whose influence has promoted the use of objectives in connection with educational programs.

Historically, the value of behavioral objectives has been a controversial issue among educators. Evidence of the controversy is reflected in the literature by articles such as "Behavioral Objectives? Yes" (Gagne, 1972) and "Behavioral Objectives? No!" (Kneller, 1972). Gagne (1972) stated that behavioral objectives are necessary in order to communicate expectations to students, to aid in design of learning tasks and to evaluate the outcomes of educational experiences. Others advocating the utilization of behavioral objectives in the planning, design and evaluation of instruction include: Bloom (1956), Walbesser (1963), Krathwohl (1965), Kurtz (1965), Montague and Koran (1969), Glaser (1969), and Sharpe (1969). Implicit in these arguments is the assumption that given objectives, student learning will be enhanced.

George Kneller (1972) has stated that the behavioral objectives approach is based on assumptions about human behavior that are reductionist, deterministic and physicalistic. He further stated that the behavioral objectives approach contradicts the view that learning is self-directed, unstructured, and in a large part unpredictable. Others who have questioned certain aspects of the use of behavioral objectives include Atkin (1968), Ebel (1970), Eisner (1967) and Combs (1972). Their concerns are concentrated in the areas of curriculum planning, individualization of instruction, student-teacher creativity and worthwhile goals of education. In answer to the critics of behavioral objectives, Popham (1969) has responded in a paper entitled, "Probing the Validity of Arguments Against Behavioral Goals," in which he responded to reasons educators have given for their opposition to behavioral objectives. Popham included the following reasons for his support of behavioral objectives.

1. Written objectives make it possible for the teacher to evaluate the worth of his/her instructional goals.
2. Written objectives contribute to the centering of unplanned classroom discussion toward worthwhile goals.
3. Written objectives permit the meaningful evaluation of changes in student cognitive behavior which is a primary responsibility of the schools.
4. Written objectives make efficient instruction possible.
5. Written objectives permit teachers to evaluate themselves in reference to changes in observable student behaviors.

The arguments for and against behavioral objectives have not concentrated directly on the issue of effect on student achievement, but have focused on indirectly related issues such as curriculum planning, teacher direction, and evaluation. However, some investigators have turned to research to examine the relationship between behavioral objectives and student achievement. A review of this research will appear in this paper under the heading entitled, Related Theory and Research.

In general, studies conducted to determine the effect of behavioral objectives on student achievement have produced inconclusive findings. These studies have examined independent variables including specificity of objectives, learning level of objectives, learner aptitudes, and density of objectives relevant to sentences in textual material. Many of these studies have been plagued by improper experimental designs and insufficient thought regarding the role which behavioral objectives play as aids to learning. The number of studies which have been conducted with adequate design and control are few in number, so that few generalizations about the effects of objectives can be made at this time.

Related Theory and Research

The studies reviewed in this paper have been grouped into four categories. The first group of studies deals with investigations which were conducted to determine the effects of specific, non-specific objectives, and no objectives on student achievement. The second category deals with studies which assessed the effects of objectives on various levels of learning. The focus of the third category was on studies which were conducted to investigate the interactive effects between certain student aptitudes and a behavioral objectives treatment. A fourth category deals with studies in which the effects of questions or behavioral objectives placed in textual material have been evaluated as elicitors of student attention and the subsequent achievement facilitated by those attending behaviors.

Comparison of Specific Objectives, General Objectives, and No Objectives On Student Achievement

This first group of studies reviewed investigated the hypothesis that students who received objectives which were written in specific behavioral terms prior to instruction would learn more, as measured by an objectives based test, than students who either received no objectives or objectives written in general (non-specific) terms. The latter resembling what are commonly called instructional goals.

Doty (1968) conducted a study to assess the treatment effects of prior knowledge of objectives on a unit in which students were tested on reading and calculating the value and tolerance of carbon axial resistors. Students were randomly assigned to a group which received prior knowledge of objectives or a group which did not receive objectives. A pretest was administered to all students. Students who had prior knowledge of the behavioral objectives scored significantly higher on a posttest than students who did not receive objectives. However, the experimental design did not permit the researcher to determine the pretest effects on achievement.

A study conducted by Bishop (1969) was not supportative of the facilitative effects of behavioral objectives. Intact vocational agriculture classes were randomly assigned to a behavioral objectives treatment group or a no-objectives control group. The behavioral objectives groups were exposed to objectives prior to instruction. All groups took a pretest, received classroom instruction, and took a posttest and retention test. An analysis of covariance was used to analyze the data for comparison of performance scores. Students who received prior exposure to objectives failed to achieve at a significantly higher achievement level as measured by both the posttest and retention tests.

Another study (Olsen, 1973) supported the facilitative effects of objectives on achievement and retention. Fourteen intact ninth grade physical science classes were randomly assigned to the experimental or control groups. Eight classes received instruction in physical science but did not receive behavioral objectives. The experimental group received 36 objectives and assessment tasks which corresponded to each objective. At the end of a three-month instructional period all students were given a 50-item posttest. A 50-item retention test was also administered three weeks after the posttest. The experimental classes attained significantly higher mean scores than the control classes on both the achievement and retention tests.

The results of the Olsen study should be interpreted with caution. It is not clear that the posttest measured mastery of the objectives. There was also the uncontrolled effect of the assessment tasks received by the experimental groups but not received by the control groups. The assessment tasks were therefore an uncontrolled variable which may have facilitated the greater achievement by the experimental group.

Baker (1969) compared the achievement of students assigned to teachers who were either provided with a list of behavioral or non-behavioral objectives. The 18 social science teachers who participated in the study were instructed to teach the objectives during two instructional periods after which a posttest was administered. No significant differences were found when group means on the posttest were compared. The author reported that teachers' faulty understanding of the need for a congruent relationship between objectives, content, and test items probably accounted for the lack of achievement differences among groups.

Dalis (1970) compared the effects of precisely written objectives and generally stated objectives on student achievement in a three week unit on health. Prior to instruction, treatment groups received an orientation to the use of objectives. The precisely written objectives group scored significantly higher on a posttest than did the generally stated objectives group. The study supported the hypothesis that students who received specifically written objectives and instruction regarding their use were able to match relevant learning activities to instructional objectives.

An investigation conducted by Tiemann (1968) supported the findings of the Dalis study. His study investigated the effects of providing general objectives or specific objectives to two treatment groups in a college economics course. Significant effects between treatment groups were not found on mid-term test scores. However, when the two groups were compared on final examination scores the behavioral objectives group scored significantly higher. In the opinion of this author, the mid-term test items may have acted as cues to orient the students as to how the objectives were to be used. The group which received specific objectives was then able to look at objectives and accurately predict the content of the final examination questions. Therefore, when attending to content material, their attention would be directed and focused on information relating to the specific behavioral objectives.

A study conducted by Boardman (1970) compared groups which either received objectives or a placebo prior to instruction or independent study. An analysis of variance procedure revealed no significant differences in the achievement among groups. However, a correlation analysis showed that with the group that studied independently, performance was definitely related to the students' understanding of the use of objectives. Boardman (p.3268A) went on to state, "There was a definite indication that students need instructions in the use of behavioral objectives. This help needs to be more than mere printed instructions if the objectives are to be of significant value in enhancing learning."

The additional dimension of orientating teachers to behavioral objectives in addition to providing students with specific objectives prior to instruction was investigated by Bryant and Anderson (1972). Teachers were divided into two groups. One group received instruction on the preparation and use of behavioral objectives. The other group received no instruction and did not utilize objectives in teaching. Pupils were divided into groups whose teachers either received objectives or did not receive objectives. In addition, some pupils were given objectives prior to beginning instruction and some did not receive objectives. Pupils of trained teachers performed significantly better on a criterion posttest than did pupils of untrained teachers. However, no significant differences of achievement was measured between students who received objectives and those who did not receive objectives.

Jenkins and Deno (1971) investigated the effects on achievement of both the teachers and students having prior knowledge of behavioral objectives. Teachers were randomly assigned to one of four experimental groups (1) general or specific objectives; and (2) teacher only or teacher and student knowledge of objectives. Students received either general or specific objectives and received teacher instruction or studied independently. No significant differences among treatment groups were found on a 56-item posttest. The authors hypothesized that the non-significance between groups was possibly due to the highly structured content material or that the objectives received inadequate attention from teachers and students.

Jenkins' and Deno's hypothesis regarding the effects of high structured content material was supported in studies conducted by Weinberg (1970) and Smith (1967). In both studies significant differences between objectives groups and no-objectives groups were not measured after students had been exposed to highly structured materials and instruction.

A study conducted by Coleman and Fowler (1973) also indicated that the facilitative effects of behavioral objectives are negated by a highly structured instructional system. Freshman in a physical science class were randomly assigned to a behavioral objectives treatment or a no-objectives treatment during a 12-week period. Students in both groups were intermixed in the same classrooms and therefore both groups received the same instruction. The experimental group received written objectives prior to instruction while the control group received a written placebo before instruction. The authors reported that both groups were unaware of the experiment. It is assumed that both groups were compared on one 12-week examination. No significant difference was reported. Although details regarding important aspects of the study were not reported, it was stated that the nonsignificant differences in test achievement could be attributed to the highly structured nature of the physical science program in the study.

In summary, approximately one half of the reviewed studies revealed significant positive effects on student achievement due to the availability of specifically written behavioral objectives. The key factor which appears to enhance student performance is the orientation of the student to the use of objectives before instruction begins. Factors which appear to negatively interact with the effects of behavioral objectives include highly structured instructional programs and pretest effects.

Behavioral Objectives and Learning Levels

The studies reviewed in this second category include investigations which determined the effects of behavioral objectives on various levels of learning as defined by Bloom et al. (1956).

According to Duchastel and Merrill (1973), a study by Oswald and Fletcher (1970) investigated the effects of objectives on two levels of achievement. In that study students were assigned to a specific objectives group or a general objectives group. Within those groups, students received either knowledge level objectives or comprehension level objectives. After receiving objectives, students read content material for 25 minutes. No significant differences were found between groups on a 40-item posttest or an identical retention test which measured "knowledge" and "comprehension" levels of the content material.

A study conducted by Stedman (1973) investigated the effectiveness of providing high school students with objectives of various cognitive levels prior to a programmed unit on genetics. The objectives represented four cognitive levels including: (1) knowledge; (2) comprehension; (3) application and (4) analysis. One hundred and forty-four high school students were randomly assigned to one of four treatments including: no objectives, general objectives, and two forms of specific objectives. The posttest consisted of 28 items; seven items for each cognitive level. Posttest results revealed no significant differences between groups on any of the four cognitive levels. The author hypothsized that the highly structured nature of the learning materials may have interfered with any effects attributable to the objectives.

Unlike the previous two studies, Papay (1971) found objectives to be more effective with one cognitive level than another. In this study 229 introductory psychology students were assigned to one of twelve treatment groups or one of four control groups. Treatments included questions, advance organizers or behavioral objectives. As Duchastel and Merrill (1973) pointed out, the objectives were more effective for retention of knowledge level information than for retention of comprehension level information. All students in this study took a pretest and, therefore, pretest effects were not measured.

In summary, the extent to which behavioral objectives influence various cognitive levels of learning has not been determined at this time. A definite need exists for conducting more research studies in this area. Such studies are especially important because a frequent criticism of the use of objectives is that teachers seldom write objectives to measure more than factual knowledge.

Behavioral Objectives and Learner Aptitudes

An aptitude may be defined as "any characteristic of the individual that facilitates or inhibits his learning from some designated instructional method"(Koran and MacKenzie, 1972, p.45). According to Snow and Solomon (1968):

> The term "aptitude" refers to any individual difference variable which functions selectively with respect to learning, that is, which appears to facilitate learning in some students and some instructional treatments. The term does not mean "general mental ability" (pp.347-348).

Examples of learner aptitudes can include visual accuity, intelligence quotient, prerequisite knowledge, vocabulary achievement, and short or long term memory.

A continuous problem encountered by educators is that of designing instruction to meet the learning needs of large numbers of individuals possessing dissimilar aptitudes or abilities. A common strategy has been to seek the one best method of instruction and to utilize it with all students. However, when a group of students engage in a single mode of instruction it is reasonable to believe that some students will possess certain aptitudes that facilitate their achievement while other students will possess aptitudes that either fail to facilitate achievement or inhibit achievement. Cronbach (1957) has argued:

> Treatments are characterized by many dimensions; so are persons. The two sets of dimensions together determine a payoff surface . . . Ultimately we should design treatments not to fit the average person, but to fit groups of students with particular aptitude patterns which correspond to modifiable aspects of the treatment (p. 681).

An implication of Cronbach's statement is that educators should take advantage of possible facilitative interactions between learner aptitudes and instructional treatments. "A review of the literature provides both theoretical and empirical support for the position that a person may learn more easily by one method than another, that this best method differs from student to student, and that such differences are related to learner characteristics" (Koran and Mackenzie, 1972, p. 45). Therefore a task for educators is to match instructional treatments with certain learner aptitudes in order to optimize the learner's opportunity to achieve maximum learning.

Review of studies

In the following reviewed studies investigators attempted to determine which learner aptitudes interacted with a behavioral objectives treatment to optimize learning for selected groups of students.

The effects of presenting students with objectives and a learning hierarchy for a unit of instruction to students of three ability levels was investigated by Cook (1969). Eighty-eight elementary education majors were given ten self-instructional mathematics booklets during an

8-day period. Subjects were assigned to one of four groups: (1) a control group, (2) an objectives group, (3) a learning hierarchy-outline group, and (4) an objective-hierarchy group. Subjects were blocked into three ability groups according to their grade in a previous math course. Performance tests given immediately after the intructional units revealed no significant differences among the four treatment groups. Middle level ability students profited more from the behavioral objectives-learning hierarchy treatment than did the low or high ability students, however, the author did report that the interaction was significant. The author hypothesized that the non-significance between treatment groups could have been attributable to the high degree of structure of the content material in addition to lack of control of possible communications between individuals in treatment groups.

Students of three ability levels received either objectives and science materials or no objectives and science materials and were then compared on achievement in a study conducted by Colon (1970). Students were blocked (high, medium, low) on the California Test of Mental Maturity. The performance of the behavioral objectives group was superior to the control group on a standardized achievement test designed for the science program used but differences between groups were not statistically significant. There was also no significant interactive effects between ability levels and treatments.

Kueter (1970) investigated the effects of personality factors on a teaching strategy which included either objectives or no-objectives. Middle school students were blocked on fourteen personality factors and then randomly assigned to an objectives group or a no-objectives group. All subjects observed a 10-minute film entitled, "The Monarch Butterfly," and took a recognition test immediately afterward. An identical test was given one week later. The behavioral objectives group scored significantly (.01 level) higher on both tests. However, the behavioral objectives treatment did not significantly influence the achievement of any particular personality type.

Merrill and Towle (1972) conducted a study which assessed the effects of presenting instructional objectives to students in a graduate computer-managed course. Thirty-two subjects were divided into either a behavioral objectives or a no-behavioral objectives group. The authors hypothesized that the availability of behaviorally stated objectives would reduce test item response latency, increase study time, and reduce "state anxiety." Differences on the posttest were not expected because subjects were required to reach criterion on each learning task.. Significant differences were not revealed between groups on unit test scores, study time, or test item response latency. However, there was a significant reduction in the "state anxiety" level of the behavioral objectives group, which could mean that the objectives actually interacted with instruction utilizing behavioral objectives.

In only one study (Cook, 1969) was an aptitude x treatment interaction found between learner characteristics and a behavioral objectives treatment. In that particular case the aptitude was a previous grade achieved in a math course. Cook gave no evidence that the math grades were based on statistically reliable tests. In addition, the statistical procedures for determining that an interaction was found were not given.

It is evident that the choosing of aptitude measures for use in the studies reviewed has not been carefully rationalized. The effects to which learner aptitudes interact with behavioral objectives to produce student achievement requires more investigation before conclusions can be drawn.

Behavioral Objectives and Mathemagenic Research

Ernst Rothkopf (1966) has called questions inserted in reading material "test like events" which elicit inspection behavior by the learner. Rothkopf has termed these inspection behaviors "mathemagenics." The roots of the term are "mathma", which means that which is learned and "gegnesthai" which means to be born.

In general, anything which acts to make a student attend to instructional material can be considered a mathemagenic device. In the studies reviewed, behavioral objectives potentially functioned to assist students to focus their attention on instructional stimuli, provided certain conditions were met. These conditions included: (1) a student's ability to remember the behavioral objectives throughout an instructional period and (2) a student's knowledge of how to utilize behavioral objectives as aids to learning. Behavioral objectives are therefore mathemagenic devices as they elicit an inspection/attending behavior by the student.

Several studies have explored the facilitative learning effects of questions inserted in textual material as "mathemagenic" devices. These studies are relevant to any future investigations of the facilitative effects of behavioral objectives placed in textual material because both mathemagenic devices elicit similar attending responses by the learner.

Rothkopf (1966) conducted a study which investigated the effects of questions in written material that hypothetically acted to elicit mathemagenic activities by students. Questions followed by different conditions of response and feedback were placed either before or after prose passages within textual material. Experimental groups were compared on two posttests. One posttest (relevant learning test) consisted of the same specific questions (14 questions) used within the treatment materials. The other posttest (incidental learning test) was composed of 25 questions which were not used within the treatment materials. Questions placed before passages in the written material had facilitative effects only for the relevant learning test. Questions placed after passages had facilitative effects for both relevant and incidental learning. A control group which received no questions and no instructions attained the lowest achievement of all groups. A Direction Reference Group (DRG) was treated exactly as the control group except they received directions to read slowly and carefully and that the information they were to read contained many facts. The DRG scored higher than all other groups on the incidental test. This study provides evidence that questions, asking for specific factual information placed before reading material facilitates learning of the material on which the learner's attention has been focused by the question. It also provides evidence that questions which focus the reader's attention on specific content inhibits the learning of incidental information.

A study conducted by Frase (1967) supported the finding of Rothkopf's investigation. In the Frase study questions were placed either before or after each passage was read and the length of the passages was varied. Like Rothkopf, Frase found that placing questions after the prose passages created optimal conditions for both specific (relevant) and general (incidental) retention and that questions placed before prose passages facilitated retention of relevant information, but such questions may have depressing effects on the learning of incidental information.

A later study by Frase (1968) also demonstrated the facilitative effects of questions placed before written material. In this study 84 educational psychology students were assigned to one of three experimental groups. All subjects received a question before reading a 36 word passage containing factual information about people's birth dates and occupations. Questions were one of three types for each group: (1) specific (2) comparative or (3) general. Although the questions were of three types, they all required the subjects to read for factual information. Subjects were compared on a multiple choice test of 9 items. Respectively the means for the specific, comparative and general group were 4.75, 4.25 and 3.25. The author explained the results of the study as follows:

> . . . Subjects were forced to respond discriminately to the stimuli when irrelevant components were added.
>
> Questions can be used effectively because they function to control subjects attention. Berlyne (1965) maintains that attention is a negative process-- it consists of information rejection. A precise question, such as asking for the name of an author, date of birth, etc., might allow subjects to ignore all but one sentence of a reading passage. If the question were more general, for instance, asking which of two authors was born earlier, subjects would have to take more of the information into account in order to answer the question. Schroder, Drive, and Streufert (1967) also emphasize the view that information rejection is a concomitant of attention. They point out that subjects "filter" inputs (by rejecting certain information), and that more filtering will occur as the information load is increased. Information load may increase to a point at which subjects will abbreviate the task at hand, adopting what may seem to be an optimal strategy. Under high load, for instance in a lengthy connected discourse task in which reading behaviors are not precisely controlled, overall retention of the passage would decrease if subjects adopted a strategy which omitted some necessary step, such as practicing stimuli, practicing responses, or associating the two (p. 199).

The studies reviewed thus far have dealt with the facilitative effects of questions which elicit search and recall of factual information. A possible generalization can be made from these studies that questions inserted in written material which require recall of factual information do indeed facilitate the learning of factual information.

The questions utilized in the studies reviewed thus far are classified at the level of "knowledge learning" according to Bloom *et al.* (1956). A study conducted by Watts and Anderson (1971) found that questions inserted in reading material which required responses at the application level of learning did indeed facilitate learning responses at the application level. The application level questions also facilitated learning at the comprehension and knowledge levels of learning. Although in the Watts and Anderson study questions were placed only *after* written material, the results of the study do permit one to speculate that the level of questions placed before prose passages can influence the level of learning that occurs as the learner reads.

Watts and Anderson (1971) have referred to questions in textual material as "forward shaping" devices and "backward review" devices. "Forward shaping" questions (questions placed before textual passages) are assumed to act as cues which direct the learner's attention to specific information within textual material. When the specific information is used to answer a question, the learner is reinforced and he will attend to subsequent questions and information relevant to them. "Backward review" questions placed after textual passages are assumed to act as cues which stimulate the learner to mentally review previously read material and selectively perceive the information he considers to be relevant to cues found within the question. This mental "backward review" acts as additional practice which may increase the acquisition of information.

A series of studies on behavioral objectives which have evolved from the investigations on adjunct questions have been conducted by

Rothkopf and Kaplan (1972, 1974) and Kaplan (1974). In an initial Rothkopf and Kaplan study (1972), intentional (relevant) and incidental learning were studies in relation to (a) the density of sentences in textual material relevant to behavioral objectives, and (b) the specificity of the behavioral objectives. Density was defined as the proportion of sentences in the text which were relevant to the behavioral objectives. Behavioral objectives were defined as "specific" if only one sentences in the text related to one behavioral objective. Objectives were defined as "broad" if 2-5 sentences in the text related to one objective.

The major findings of these studies were: (a) students who received specific objectives achieved significantly more intentional learning than students who received broad objectives, but incidental learning was not affected by the type of objective presented; and (b) incidental learning was not affected by the density of relevant sentences in the text, however increases in density resulted in a significant decrease in the likelihood that any intentional item was learned. This latter finding could possibly indicate that an increased memory load on a student resulted in a decreased learning efficiency.

Two additonal findings of the study were: (a) intentional learning was significantly greater ($p \leq .001$) than incidental learning for those groups that received objectives; and (b) the treatment groups scored significantly higher on the posttest composed of intentional and incidental items than the control groups which received no objectives but were given directions to learn everything in the textual material.

Rothkopf and Kaplan (1974) replicated the 1972 experiment and extended the investigations to determine if the nature of the objectives affected the amount of time used for studying (inspection time) the textual material. In addition, the effects of the absolute number of objective-relevant sentences in the text and the effects of density were explored. Significantly more inspection time was spent with specific objectives than with broad objectives. It was also found that the likelihood of mastery of any objective decreased with an increase in the absolute number of objective relevant sentences, but was relatively independent of passage length.

Findings of this study which duplicated the findings of the 1972 study included: (a) specifically stated objectives resulted in greater intentional learning than broad objectives, and (b) the experimental groups scored significantly higher than control groups (no-objectives) on a posttest composed of intentional and incidental items. This latter finding is particularly interesting because a frequent criticism of behavioral objectives is that they give the learner tunnel vision and limit learning only to objective relevant material.

In the two Rothkopf and Kaplan studies described the learners were presented with a list of objectives which was available while they read the textual material. This is a potentially serious flaw in the studies because a learner could refer back to the objectives at any given time after they were initially read. One can assume that the number of times a learner referred back to the objectives was an uncontrolled variable.

A study conducted by Kaplan (1974) increased the control over this variable although it was not the author's rationale for his investigation. According to Kaplan (1974):

> . . . the likelihood of learning objective-relevant material was greater with (a) shorter passages, (b) fewer objectives, and (c) more specifically phrased objectives. However, instructional materials are seldom only a few pages in length and contain a small proportion of objective-relevant material. Further, the desirability of short passages and few objectives conflicts with the desirability of specifically phrased objectives. That is, a greater number of specific objectives is required to cover the same instructional points than the more generally phrased objectives. Therefore, the type of instructional material that students are usually required to learn is at variance with the best use of objectives suggested in the Kaplan and Rothkopf (1974) study (p. 787).

Therefore, Kaplan explored the effects of placing partial lists of objectives either among corresponding text segments or presenting all objectives prior to the text. This procedure is similar to the studies in which questions were inserted in textual material Other independent variables in the study were: (a) passage length, (b) specificity of objectives, (c) proportion of objective-relevant text sentences to total number of text sentences (density), and (d) inspection time.

A primary finding of the study was the "part" presentation of objectives resulted in significantly greater intentional learning that was produced with the "whole" presentation, with no significant loss of learning. However, it appears that as in the Rothkopf and Kaplan (1972, 1974) studies, students could refer back to the objectives at any given time in either treatment condition. Therefore, the number of times a learner referred back to the objectives was possibly an uncontrolled variable. Neither specificity nor density of objectives was found to differentially influence achievement, but passage lengths of 56 sentences (shorter segments) resulted in significantly greater achievement than longer lengths of 113 and 169 sentences. This latter finding was true for both "part" and "whole" presentations, longer passages, specific objectives and larger densities.

The finding that both intentional and incidental learning for "part" and "whole" presentations decreased as a function of passage length is possibly consistent with the finding that the "part" presentation was more effective than the "whole" presentation. This is because conditions of "part" presentation and shorter passages required less memory load on students and they therefore achieved more learning than students in treatment conditions which did not provide memory support.

Several findings of the Kaplan study are consistent with previous studies. Intentional learning with "whole" presentations was greater than the reference groups' (no-objectives group) performance for every passage length. This finding is consistent with the Rothkopf and Kaplan (1974) study. The greater intentional learning found with "part" presentations over the reference groups' (no-objectives) performance at every passage length is consistent with the finding of the Frase (1967) study in which adjunct questions were placed in written material. Both intentional and incidental learning for "part" and "whole" presentations decreased as a function of passage length. This finding is consistent with the Rothkopf and Kaplan (1974) study. This provides further support for this author's hypothesis that an increased memory load on students resulted in a decreased learning efficiency in the Rothkopf and Kaplan (1972, 1974) and Kaplan (1974) studies.

In summary, the review of studies on behavioral objectives and questions as mathemagenic devices permits the following generalizations:

(a) Studies in which behavioral objectives and adjunct questions were a component of instructional programs have provided inconsistent results regarding their effects on incidental learning.

(b) Adjunct questions and behavioral objectives can effectively act as "forward shaping" devices.

(c) Unlike studies on adjunct questions, behavioral objectives have not been investigated as "backward review" devices. Research has provided evidence that adjunct questions placed after textual material to act as "backward review" devices facilitate both relevant and incidental learning. It is therefore logical to hypothesize that behavioral objectives placed in textual material in such a way to elicit a backward review response from the learner would also facilitate both incidental and relevant learning. The effects of behavioral objectives as "backward review" devices therefore needs to be investigated.

(d) There are indications that objectives are more effective if they are presented as partial lists placed within text segments as compared with presenting all of the objectives prior to text material.

Summary and Discussion

The review of literature has revealed that behavioral objectives can be an aid to learning in certain instructional settings. A majority of the studies which compared the achievement of students who received either specifically written objectives, general objectives, or no objectives found no significant differences between treatment groups. However when significance was found it was always in favor of the specifically written objectives treatment group.. Studies also indicate that objectives are effective "forward shaping" mathemagenic devices. Unlike studies on adjunct questions, behavioral objectives have not been investigated as "backward review" devices. Findings were inconsistent for studies in which the effects of behavioral objectives on various cognitive learning levels were assessed. In addition, an insufficient number of such studies have been conducted from which to make generalizations about the interaction between objectives and learning levels. Investigations in which the effects of interactions between learner aptitudes and behavioral objectives were assessed were neither conclusive or generalizable.

Many of the investigations in this review were plagued by improper experimental designs and insufficient thought regarding the role which behavioral objectives play as aids to learning. These factors resulted in weaknesses common to many studies in which behavioral objectives were not shown to facilitate learning. In the opinion of this author, the weaknesses of the reviewed studies are as follows:

(1) A common weakness was the failure of investigators to determine pretest effects. In several experiments it appeared that pretest questions could have acted as information cues and, therefore, nullified the cueing effects of behavioral objectives.

(2) Another potential fault which occurred in the reviewed studies was the utilization of highly structured instructional materials. Behavioral objectives can act as organizers of information. Therefore, in highly structured material such as programmed materials, the addition of behavioral objectives probably would not impose enough additional structure to produce greater learning. Since cues are an integral component of highly

structured learning materials, any cueing effects of objectives would be nullified.

(3) In several studies in which no main effects were found, the authors pointed out that students were not knowledgeable as to how objectives were to be utilized. The Dalis (1970) and Tiemann (1968) studies are clear indicators that objectives can be effective aids to learning if students know how to use them.

(4) Studies in which behavioral objectives were investigated as "forward shaping" devices have lacked proper controls and are few in number.

(5) Aptitude measures chosen for investigation have not been selected on the basis of sufficiently thought out rationales. When choosing an aptitude measure to interact with a treatment, it is important that a task analysis is performed on the experimental cognitive task before aptitude measures are selected.

As previously stated it is apparent that behavioral objectives can facilitate learning in some instructional settings. Weaknesses of the conducted research on objectives have hopefully been identified and can be corrected. Needs in future research on behavioral objectives include:

(1) Behavioral objectives need to be investigated as "forward shaping" and "backward review" mathemagenic devices.

(2) In future investigations students need to receive training regarding the use of objectives before a study is conducted.

(3) Textual materials used in behavioral objectives studies should not be highly structured but should resemble chapter material in a standard text book.

(4) Experimental designs should be utilized that properly control those variables which would otherwise interfere with a behavioral objectives treatment.

(5) Aptitude measures which are expected to interact with a behavioral objectives treatment should be selected on the basis of an information processing analysis performed on the mental task which the student will be required to perform during his participation in the experiment conducted.

The facilitative effects of behavioral objectives on student learning is still an empirical question which needs to be answered. Therefore, additional research should be conducted and should assess the effects of behavioral objectives on student achievement while controlling major contaminating factors present in earlier studies.

Statement of Hypotheses

Based upon the previously reviewed research and theory, the following research hypotheses were tested.

1. Subjects receiving written behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than subjects receiving written behavioral objectives placed after written passages within the textual materials.

2. Subjects receiving written behavioral objectives placed after passages within textual materials will exhibit significantly greater acquisition of incidental information than subjects receiving written behavioral objectives placed before passages within textual material.
3. Subjects receiving behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than incidental information.
4. Subjects receiving written behavioral objectives placed before passages within textual materials will exhibit significantly greater acquisition of relevant information than subjects receiving all the written behavioral objectives before the complete textual materials.
5. Subjects receiving the complete list of written behavioral objectives placed after the textual materials will exhibit significantly greater acquisition of incidental information than subjects receiving the complete list of behavioral objectives placed before the textual materials.
6. Subjects receiving written behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than subjects receiving the textual materials without behavioral objectives (control group).
7. There will be a differential relationship between criterion performances and aptitudes of subjects, relative to the treatment received.

CHAPTER II

EXPERIMENTAL DESIGN

The Design

A modified posttest only, control group design as described in Table 1, was used with four experimental groups and one control group (Campbell and Stanley, 1963). The posttest only, control group design does permit one to evaluate the effects that an independent variable has on a dependent variable (Kerlinger, 1964). This design did not assess entering knowledge. However, it was felt that since pretest questions could potentially act as cues and therefore nullify the cueing effects of behavioral objectives and because total randomization was possible, this would be an appropriate design.

A pilot posttest was administered to a randomly selected group of students from the experimental population two weeks prior to conducting the experiment. Scores on that posttest indicated that students did not possess enough prerequisite knowledge about the subject matter to be used in the experiment to influence the treatment effects.

The aforementioned design has no threats to internal validity but does contain two possible sources of external invalidity (Campbell and Stanley, 1963). These possible threats to external invalidity include: (1) interaction of selection and treatment, and (2) reactive arrangements.

TABLE 1

EXPERIMENTAL DESIGN

Group		Treatment	Posttest
Group I	R	X (behavioral objectives placed before passages within textual material)	0_1
Group II	R	X (behavioral objectives placed after passages within textual material)	0_2
Group III	R	X (all behavioral objectives placed before textual material)	0_3
Group IV	R	X (all behavioral objectives placed after textual material)	0_4
Group V	R	X (textual material only-no behavioral objectives)	0_5

Aptitude Measurements

Subjects were given two aptitude measures prior to their participation in the experimental procedures. The aptitude measures administered were taken from the Kit of Reference Tests for Cognitive Factors (French, Elkstrom, and Price, 1963). The tests selected were Vocabulary Test V-2 and First and Last Names Test Ma-3. These tests were designed to measure a person's ability to understand word meanings and a person's short-term associative memory ability. Aptitude tests appear in Appendix A.

The selection of the vocabulary and memory tests was guided by two information processing models; Melton's (1967) multiprocess model of learning and Gagne's (1974) model of information processing. Both models permit one to identify the information processing steps in which the learner engages when confronted with instructional stimuli. The researcher can then analyze a particular instructional treatment in terms of an experimental subject's thought processes and decide what aptitudes would enable the learner to take advantage of the treatment to optimize achievement.

The Vocabulary Test V-2 was selected in anticipation that students' vocabulary achievement (an aptitude) would interact with the behavioral objectives treatments. Based on a previous study (Baker, 1976) it was believed that the greater a person's vocabulary achievement the better that person would be able to take advantage of the written behavioral objectives treatments. The vocabulary test was composed of 36 multiple-choice items. Students were given eight minutes to complete the timed test. Students' scores were determined by the correct number of answers.

The short term associative memory test measured students' ability to remember first names and their associated last names after seeing both names together. Students studied a page showing 15 full names for a given time period. Then students turned to a page which showed only the rearranged last names and were asked to fill in the correct first names from memory. Students followed these procedures for two sets of 15 names. The test was timed and all students started and finished within the same time frame. Students' scores were determined by the correct number of answers.

The associative memory test was selected to determine if students with a high memory score could capitalize on the behavioral objectives treatment more efficiently than students with a low memory score. It was anticipated that students who received behavioral objectives and scored relatively high on the associative memory test would capitalize on their memory aptitude by associating specific textual content to the behavioral objectives. Thus their attention would focus on the information relevant to the posttest and their achievement would therefore be enhanced.

Treatment Procedures

Subjects

Tenth and eleventh grade students enrolled in a social science course at P.K. Yonge Laboratory School were identified as suitable subjects on the basis of a previous pilot study, availability, and the congruency between the nature of the treatment materials and the nature of the social science course in which subjects were enrolled. The distribution of experimental subjects by sex and grade level appears in Table 2. A total of 110 subjects read the material on sex education, completed the posttest, and completed at least one aptitude measure.

TABLE 2

DISTRIBUTION OF SUBJECTS BY SEX AND GRADE LEVEL

Group		Number	Sex		Grade Level	
			Male	Female	10	11
Group I	(behavioral objectives placed before passages within textual material)	21	11	10	10	11
Group II	(behavioral objectives placed after passages within textual material)	21	10	11	12	9
Group III	(all behavioral objectives placed before textual material)	22	12	10	11	11
Group IV	(all behavioral objectives placed after textual material)	23	9	14	12	11
Group V	(textual material only-no behavioral objectives)	23	11	12	11	12

Twenty-nine students from the experimental population were administered a pilot posttest prior to the experiment. As previously mentioned these randomly selected students were given a posttest to estimate the amount of prerequisite knowledge possessed by the experimental population. These students did participate in the experiment but their test scores were not included as part of any comparison group.

General Procedures

Subjects participated in the experiment during a two-hour period in which they were normally engaged in the activities of a social studies class. A total of three tenth grade classes and three eleventh grade classes were involved in the experiment. It was determined that no particular class was composed of students unique in ability or interests. Subjects within each class were randomly assigned to one of four treatment groups or a control group.

Each two hour experimental session began with an introduction to the experiment and an explanation regarding how behavioral objectives should be utilized in a learning situation. The verbal explanation about behavioral objectives was presented to each class by the experimenter with the aid of overhead transparencies (Appendix B). The explanation was the same for each class and was approximately 15 minutes in length. During that time, the term behavioral objective was defined and examples of behavioral objectives were shown with questions which measured them. In addition, students were shown examples of objectives which were either preceded or followed by written material and asked to identify that part of the written material which was relevant to the objectives. The purpose of the orientation to behavioral objectives was to provide the subjects with knowledge of a strategy for using objectives in the context of the experimental textual materials.

Subjects then received the written treatment materials and were given verbal instructions to read the directions at the beginning of the treatment materails, read through the treatment materials and then complete the test based on the textual material. Subjects were given approximately one and a half hours to read the treatment materials and complete the test. A record of the time required for completion of the materials was not made, but all subjects who completed the materials and test finished within the alloted time period. A few students failed to complete the experimental task. These subjects were not considered part of the sample for the data analyses.

Treatment Materials

Textual Material

A 12 page instructional unit on birth control and sexual anatomy was developed from information in a booklet entitled, The Crucial Generation (Van Vleck, 1971). Materials in the unit were selected because they were readable, attractive, and perceived as being interesting to students. The textual material was designed to be similar in format to a chapter in a standard biology or social sciences test. Behavioral objectives and test items were then added to the instructional unit.

Behavioral Objectives

Eighteen specifically written behavioral objectives were generated and placed within the instructional unit. The behavioral objectives were classified as "knowledge" level objectives (Bloom, 1956). The differential placement of the objectives into the unit constituted the four different experimental treatments. The objectives were identical for all four treatment groups. The textual material without behavioral objectives constituted the control condition. The placement of objectives within each treatment package is described below.

Treatment I - Specific Behavioral Objectives Placed Within/Before Textual Material

In Treatment I, behavioral objectives were interspersed within the textual material (Appendix D). Each objective was placed immediately before the written passage to which the objective was relevant. It was hypothesized that the learner would read the objective and then focus his/her attention on the content in the passages that followed which was relevant to the objective. In this treatment the objectives were thought to produce a "forward shaping" effect. In other words, the objectives acted as cues to enable the learner to selectively perceive relevant information. The following written directions were given to subjects in Treatment I.

> Read through the written material on the following pages. Within the material you will find learning objectives (behavioral objectives). Upon completion of this unit you should be able to demonstrate your mastery of the objectives on a written test. In other words there will be test questions which match the objectives. Read the objectives carefully.

Treatment II - Specific Behavioral Objectives Placed After Textual Material

In Treatment II, behavioral objectives were interspersed within the textual material after the written passages to which the objectives were relevant (Appendix E). In all cases objectives were placed on the page following the relevant written passages. This arrangement provided a situation in which the learner would read written material, turn the page, and read an objective relevant to the material just read. It was hypothesized that the learner would read the behavioral objective and then mentally review the material previously read and hopefully recall relevant information. In this treatment the objectives were designed to act as "backward review" devices. If the objectives served the designed purpose in this treatment then the learner would also mentally review both relevant and incidental material. The following written directions were given to subjects in Treatment II.

> Read through the written material on the following pages. Within the material you will find learning objectives (behavioral objectives). Upon completion of this unit you should be able to demonstrate your mastery of the objectives on a written test. In other words there will be test questions which match the objectives. Read the objectives carefully.

Treatment III - All specific Behavioral Objectives Placed Before Textual Material

In Treatment III, a list of all 18 behavioral objectives were placed before the textual material (Appendix F). Treatment III was designed to be similar to learning modules which are commonly used in self-instructional programs. This treatment was designed so that the learners would initially read the complete list of objectives and then read the textual material. It was hypothesized that as the learners read through the textual material they would recall the objectives and focus their attention on the material relevant to the objectives remembered. This treatment was similar to Treatment I as in both treatments objectives were designed to act as "forward shaping" devices. However, Treatment III placed a greater memory load on the student than did Treatment I. The following written directions were given to subjects in Treatment III.

> Read through the written material on the following pages. At the beginning of the unit you will find a list of learning objectives (behavioral objectives). Read the objectives carefully. After reading the objectives read through the unit. Then turn to the test and demonstrate your mastery of the objectives. In other words there will be test questions which match the objectives.

Treatment IV - All Specific Behavioral Objectives Placed After Textual Material

In Treatment IV, a list of all 18 behavioral objectives were placed after the textual material (Appendix G). This treatment was designed so that learners would initially read through the textual material. Then after having finished the reading material the learners would read the list of 18 behavioral objectives and mentally review the material previously read which was relevant to the objectives. This treatment was similar to Treatment II because in both treatments objectives were designed to act as "backward review" devices. However, Treatment IV placed a greater memory load on the student than did Treatment II. The following written directions were given to students in Treatment IV.

> Read through the written material on the following pages. At the end of the unit you will find a list of learning objectives (behavioral objectives). Read the objectives carefully. You should then turn to the test and demonstrate your mastery of the objectives. In other words there will be test questions which match the objectives.

Treatment V - Control Group

No objectives were presented to subjects in the control group. However, they did receive the same textual material which was given to subjects in Treatment I through IV. The following written directions were given to subjects in the control group. See Appendix C.

> Read through the written material which follows and learn everything you can. You will be given a test at the end of the unit on the material you have read.

The Posttest

A 36 item multiple choice test was written and placed at the end of the 12 page instructional unit (Appendix H). Each question was composed of a stem, one correct answer and three distractors. As previously mentioned, the 36 item test was administered to a randomly selected group of students from the experimental population for the purpose of examining subjects' prerequisite knowledge. An item analysis was conducted on that test and three items were modified to meet an acceptable level of difficulty. The resulting 36 item multiple choice test then comprised the written criterion measure.

The criterion measure was designed to measure relevant and incidental information. Questions 1 through 18 were referenced to the behavioral objectives in the written instructional treatment. These questions therefore were thought to measure the retention of "relevant" information. Each test item (question) measured the mastery of a different behavioral objective, therefore the mastery of each behavioral objective was measured. Questions 19 through 36 were not referenced to the behavioral objectives and therefore measured retention of incidental information.

A point bi-serial correlation technique was used to evaluate the reliability of each test item. This technique is a suitable method of estimating a question's potential to discriminate between subjects who score in the top half and those who score in the bottom half of the group being tested. More specifically the reliability of each test item represents the degree of correlation between an item score and the total test score. Bi-serial correlations for questions 1 through 36 are reported in Appendix I.

The difficulties for the 36 questions were calculated and are also reported in Appendix I. Difficulty was defined as the proportion of the subjects that answered an item correctly, therefore the greater the value for difficulty the easier the item. The mean difficulty of the posttest was .671 while the range of difficulties varied from .404 to .835.

A Hoyt's Reliability Coefficient of .8770 was computed for the total posttest (items 1 - 36). This coefficient was based on the test scores of the 110 experimental subjects.

CHAPTER III

RESULTS

The primary objectives of this study were:

1. to examine the differences in learning achievement attributable to instructional treatments in which the location of behavioral objectives was varied in relation to textual materials, and
2. to explore the effects of individual differences on learning from different modes of instructional content..

This chapter will describe the statistical tests of the hypotheses and the results achieved . The presentation of results will first treat the analysis of aptitude x treatment interactions which will be followed by an analysis of the instructional treatment main effects. The analyses were computed using the University of Florida Statistical Programs Library and the SPSS Language Package.

Independent and Dependent Variables

Independent variables include those variables which are being evaluated in an experiment. The criterion by which the independent variables are being evaluated are referred to as the dependent variables. This study included independent variables described as aptitudes and the differential placement of behavioral objectives in textual material. Dependent variables included posttest questions 1 through 18 (relevant questions) and posttest questions 19 through 36 (incidental questions). Independent and dependent variables are listed in Table 3.

TABLE 3

INDEPENDENT AND DEPENDENT VARIABLES

Independent Variables		Dependent Variables
1. Vocabulary Test V-2		1. Posttest Questions 1-18 (relevant questions)
2. First and Last Names Test Ma-3		2. Posttest Questions 19-36 (incidental questions)
3. Treatment I	(behavioral objectives placed before passages within textual material)	
4. Treatment II	(behavioral objectives placed after passages within textual material)	
5. Treatment III	(behavioral objectives placed before textual material)	
6. Treatment IV	(all behavioral objectives placed after textual material)	
7. Treatment V	(textual material only-no behavioral objectives)	

Aptitude x Treatment Interactions

The following hypothesis was of major concern relative to aptitude treatment interactions:

There will be a differential relationship between criterion performance and aptitudes of subjects, relative to the treatment received.

Aptitude Measures

As previously mentioned, aptitude measures included the Vocabulary Test V-2 and the First and Last Names Test Ma-3. These tests measured verbal ability and short term associative memory. A Hoyt's Reliability Coefficient of .8337 was computed for the vocabulary test. The vocabulary test means and standard deviations for the experimental groups appear in Table 4 . A Hoyt's Reliability Coefficient of .8072 was computed for the memory test. The memory test (First and Last Names Ma-3) means and standard deviations for the experimental groups appear in Table 4 .

Evaluation for Aptitude x Treatment Interaction

Aptitude measures can be treated as continuous variables or categorical variables. In this study vocabulary scores and memory scores within each treatment group were treated as continuous variables. According to Kerlinger and Pedhazer (1973):

> Categorization leads to a loss of information, and consequently to a less sensitive analysis. . . . It is this loss of information about the differences between subjects, or the reduction in the variability of the continuous variable, that leads to a reduction in the sensitivity of the analysis (pp. 241,242).

TABLE 4

MEANS AND STANDARD DEVIATIONS FOR APTITUDE MEASURES

Treatment Condition		n	Vocabulary Test		First and Last Names Test	
			Means	Standard Deviations	Means	Standard Deviations
Group I	Treatment I	21	19.100	5.812	15.286	7.051
Group II	Treatment II	21	18.315	5.860	19.667	7.146
Group III	Treatment III	22	21.350	4.913	18.895	8.055
Group IV	Treatment IV	23	20.522	5.468	17.636	6.835
Group V	Control	23	20.364	6.160	15.905	7.549

Several preliminary investigatory steps are necessary before tests are conducted to detect aptitude x treatment interaction. A first step in investigating the possibility of an aptitude x treatment interaction is to determine that each aptitude measure is statistically realiable. Unreliable aptitude scores are not reproducible and therefore they are not generalizable. As mentioned previously, both the memory and vocabulary aptitude measures met an acceptable reliability criterion. A second step is to determine that all experimental groups have similar aptitude abilities. Table 4 provides evidence that the variance of no one experimental group differed significantly in vocabulary or memory abilities from any other group. A third step is to determine whether aptitude measures provide linear data or curvilinear data. F tests for deviation from linearity of vocabulary scores were conducted separately for the analysis of relevant test scores (1-18), incidental test scores (19-36), and total test scores (1-36). In each separate test it was revealed that vocabulary scores significantly deviated from a linear pattern and were therfore curvilinear. F values which resulted from tests for vocabulary linearity appear in Tables 5, 6, and 7. F tests for deviation from linearity of memory scores were also conducted separately for the analysis of relevant, incidental, and total test scores. In each separate test it was revealed that memory scores did not deviate from a linear pattern. The F values for memory linearity and vocabulary linearity for relevant, incidental, and total test scores appear in Tables 5, 6, and 7 respectively.

A regression solution for analysis of covariance was used to detect possible aptitude x treatment interactions. The possibility of interactions was evaluated by comparing regression slopes obtained from

TABLE 5

F TABLE FOR TESTING THE HYPOTHESIS OF APTITUDE X TREATMENT INTERACTION BETWEEN VOCABULARY SCORES AND MEMORY SCORES WITH THE RELEVANT TEST QUESTIONS (1-18)

Source	df	ss	ms	F
Vocabulary x Treatment	4	12.141	3.035	0.2794
Memory x Treatment	4	90.905	22.726	2.0920
Vocabulary Linearity	1	171.847	171.847	15.8194*
Memory Linearity	1	3.549	3.549	0.3267
Residual	99	1075.459	10.863	
Total	109			

$^{**}p < .01$

TABLE 6

F TABLE FOR TESTING THE HYPOTHESIS OF APTITUDE X TREATMENT INTERACTION BETWEEN VOCABULARY SCORES AND MEMORY SCORES WITH THE INCIDENTAL TEST QUESTIONS (19-36)

Source	df	ss	ms	F
Vocabulary x Treatment	4	18.655	4.664	0.3380
Memory x Treatment	4	39.843	9.961	0.7230
Vocabulary Linearity	1	278.059	278.059	20.1780*
Memory Linearity	1	.009	.009	0.0006
Residual	99	1364.197	13.780	
Total	109			

**p $<$ .01

TABLE 7

F TABLE FOR TESTING THE HYPOTHESIS OF APTITUDE X TREATMENT INTERACTIONS BETWEEN VOCABULARY SCORES AND MEMORY SCORES WITH THE TOTAL TEST QUESTIONS (1-36)

Source	df	ss	ms	F
Vocabulary x Treatment	4	59.237	14.809	0.3560
Memory x Treatment	4	239.098	59.775	1.4360
Vocabulary Linearity	1	951.779	951.779	22.8640*
Memory Linearity	1	5.971	5.971	0.1434
Residual	99	4127.204	41.272	
Total	109			

$^{**}p < .01$

aptitude-criterion pairs for each treatment condition using F tests for heterogeneity of regression. An aptitude x treatment interaction would be indicated by finding that compared regression lines were significantly non-parallel.

The following six combinations of independent and dependent variables were utilized to investigate aptitude x treatment interactions.

1. Vocabulary x treatment for relevant test scores (1-18)
2. Vocabulary x treatment for incidental test scores (19-36)
3. Vocabulary x treatments for total test scores (1-36)
4. Memory x treatment for relevant test scores (1-18)
5. Memory x treatment for incidental test scores (19-36)
6. Memory x treatment for total test scores (1-36)

In none of the above cases was a significant F value for heterogeneity of regression detected. The F values for vocabulary x treatment and memory x treatment interactions appear in Tables 5, 6, and 7 for the relevant questions, incidental questions, and total test questions respectively.

As previously mentioned, vocabulary scores deviated significantly from a linear pattern and were thus curvilinear. It was therefore necessary to re-analyze the vocabulary x treatment interactions while treating vocabulary scores as curvilinear data points. The possibility of vocabulary x treatment interactions was evaluated by comparing regression slopes obtained from vocabulary-criterion pairs for each treatment condition using F tests for heterogeneity of regression. The following three combinations of vocabulary scores and dependent variables were analyzed.

1. Vocabulary x treatment for relevant test scores (1-18)
2. Vocabulary x treatment for incidental test scores (19-36)
3. Vocabulary x treatment for total test scores (1-36)

In none of the above cases was a significant F value for heterogeneity of regression detected. The F values for vocabulary x treatment interactions appear in Table 8.

The above findings indicated that aptitude x treatment interactions were not present. Therefore, hypothesis number seven was not supported.

Instructional Treatment Main Effects

The following research hypotheses were of major concern relative to instructional treatment main effects.

1. Subjects receiving written behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than subjects receiving written behavioral objectives placed after written passages within the textual materials.
2. Subjects receiving written behavioral objectives placed after passages within textual materials will exhibit significantly greater acquisition of incidental information than subjects receiving written behavioral objectives placed before passages within textual material.
3. Subjects receiving behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than incidental information.

TABLE 8

F TABLE FOR TESTING THE HYPOTHESIS OF APTITUDE X TREATMENT INTERACTION BETWEEN CURVILINEAR VOCABULARY SCORES WITH RELEVANT TEST QUESTIONS (1-18), INCIDENTAL TEST QUESTIONS (19-36), AND TOTAL TEST QUESTIONS (1-36)

Source	df	ss	ms	F
Vocabulary x Treatment (Relevant Questions)	4	7.225	1.806	0.141
Residual	105	1346.675	12.826	
Total	109			
Vocabulary x Treatment (Incidental Questions)	4	11.441	2.860	0.178
Residual	105	1689.323	16.089	
Total	109			
Vocabulary x Treatment (Total Questions)	4	31.815	7.954	0.156
Residual	105	5345.503	50.910	
Total	109			

4. Subjects receiving written behavioral objectives placed before passages within textual mterials will exhibit significantly greater acquisition of relevant information than subjects receiving all the written behavioral objectives before the complete textual materials.
5. Subjects receiving the complete list of written behavioral objectives placed after the textual materials will exhibit significantly greater acquisition of incidental information than subjects receiving the complete list of behavioral objectives placed before the textual materials.
6. Subjects receiving written behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than subjects receiving the textual materials without behavioral objectives (control group).

Subjects were randomly assigned to one of five experimental groups After reading textual material subjects completed a 36-item multiple choice test. The test was composed of questions (1-18) which measured knowledge relevant to the 18 behavioral objectives and questions (19-36) which measured knowledge not relevant (incidental) to the behavioral objectives. It was the posttest scores on which the analyses for instructional main effects was performed.

Testing of Hypotheses for Main Effects

Research hypotheses numbered one, four, and six were examined using sex education achievement scores on relevant posttest questions

(1-18). These posttest scores were compared for each treatment group by using a regression equation for the analysis of covariance. Multiple regression was used because there were unequal numbers of subjects in the experimental groups. According to Kerlinger and Pedhazer (1973): "although the problem of unequal n's, when analyzing experimental data with multiple regression does not disappear, it is so much a problem as to be almost negligible" (p. 7). The selection of the analysis of covariance technique for testing differences between groups in a research design such as that used in this study is supported by Kerlinger (1967).

The analysis of covariance technique permitted the comparison of the variances of the five experimental groups after differences in variance due to vocabulary and memory abilities had been taken into account. The resulting test for instructional treatment main effects (Table 9) on sex education ahcievement questions 1 through 18 revealed that no experimental group mean score was significantly higher than any other group mean score ($F= .908$, df 4/109, $p < .05$). Hypotheses number one, four, and six were therefore not supported.

Research hypothesis number two was examined using sex education achievement scores on posttest questions 19 through 36 (incidental information). A Student's t test was conducted to assess the significance of the difference between the means of treatment groups one and two on the incidental questions. The means for groups one and two were 11.381 and 11.905 respectively (Table10). No significant difference between the means of the two groups was found ($F= .398$, df= 40, $p < .05$). Therefore, hypothesis number two was not supported.

TABLE 9

SUMMARY TABLE FOR ONE WAY ANALYSIS OF COVARIANCE

Source	df	ss	ms	F
Vocabulary and Memory	2	223.12	111.56	10.525
Treatment	4	38.48	9.62	.908
Residual	103	1092.29	10.60	
Total	109			

TABLE 10

MEANS AND STANDARD DEVIATIONS FOR RELEVANT, INCIDENTAL, AND TOTAL POSTTEST QUESTIONS

			Means			Standard Deviation		
Treatment Condition		n	Relevant Questions (1-18)	Incidental Questions (19-36)	Total Questions (1-36)	Relevant Questions (1-18)	Incidental Questions (19-36)	Total Questions (1-36)
Group I	Treatment I	21	11.667	11.381	23.048	4.187	3.930	7.736
Group II	Treatment II	21	12.429	11.905	24.334	3.310	4.592	7.437
Group III	Treatment III	22	12.091	12.091	24.182	3.176	3.866	6.544
Group IV	Treatment IV	23	11.478	11.870	23.348	4.122	4.465	8.205
Group V	Control	23	12.826	13.304	26.130	2.790	2.819	5.066

Research hypothesis number three was examined using sex education achievement scores on posttest questions 1 through 18 (relevant information) and questions 19 through 36 (incidental information) for Treatment Group I. A Student's t test was conducted to assess the significance of the difference between the means of questions 1 through 18 and questions 19 through 36. The means for relevant and incidental posttest questions were 11.667 and 11.381 respectively (Table 10). No significant difference between the means on both halves of the test was found (F= .228, df= 40, $p < .05$). Hypothesis number three was therefore not supported.

Research hypothesis number five was examined using sex education achievement scores on posttest questions 19 through 36 (incidental information). A Student's t test was conducted to assess the significance of the difference between the means of treatment groups three and four on the incidental questions. The means for groups three and four were 12.091 and 11.870 respectively (Table 10). No significant difference between the means of the two groups was found (F= .162, df= 41, $p < .05$). Therefore, hypothesis number five was not supported.

CHAPTER IV

DISCUSSION AND IMPLICATIONS

Summary of Data: Hypotheses Tests

This study sought to examine the differences in learning achievement attributable to instructional treatments in which the location of behavioral objectives was varied in relation to textual materials. An additional purpose of the study was to examine the interactions between certain learner aptitudes and the behavioral objectives treatment. Some general premises basic to this study include the following:

1. The intended instructional stimulus (physical stimulus) presented to the learner during instruction is not in simple correspondence to the stimulus actually selectively perceived and encoded by the learner, and it is the encoded stimulus which is the basis for psychological learning activity.
2. The various internal information processing activities which contribute to the encoding of an effective stimulus can be influenced by elements in the physical stimulus. Therefore, acquisition of information from an instructional situation varies as a function of the prompts and cues included in the instructional material and environment (Wilson, 1973).

3. The effectiveness of different instructional material varies from individual to individual with differences being correlated with aptitudes (Wilson, 1973).

Instructional Treatment Main Effects

In this section, research hypotheses numbered one through six will be individually restated, the finding stated, and the rationale for initially proposing each research hypothesis will be presented. Subsequently, findings are to be discussed.

Research Hypothesis Number One.

1. Subjects receiving written behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than subjects receiving written behavioral objectives placed after written passages within the textual materials.

As previously defined, textual information was identified as relevant if the information was directly referenced to a written behavioral objective. Therefore, when a subject responded correctly to posttest questions referenced to behavioral objectives (questions 1 through 18) his performance was evidence for acquisition of relevant information.

Support for this hypothesis was dependent upon finding a significant difference ($p < .05$) between the means of experimental groups one and two on the relevant posttest questions. The statistical test of this hypothesis did not reveal a significant difference between these means. Therefore, hypothesis number one was not supported.

It was anticipated that subjects who received behavioral objectives placed immediately before a passage (Treatment I) would focus his/her attention on that part of the passage relevant to the behavioral objective. The objective would then have acted as a forward shaping device. Then upon encountering a test question referenced to the objective the learner would recall the information upon which he had previously focused (relevant information) and respond to the question correctly.

In Treatment I the behavioral objectives were designed to be stimuli which would aid the learner in selectively perceiving and attending to particular bits (relevant information) of the total stimulus. The learner could then encode the relevant information and place it in memory storage to be recalled later. One possible effect on the learner in this treatment is that in the process of focusing on particular bits of information, incidental information was not perceived.

It was anticipated that subjects who received a behavioral objective placed after a passage (Treatment II) would not focus their attention on any particular part of the written passage. Upon encountering the behavioral objective placed after the written passage it was believed the learner would mentally review what he had read and attempt to focus on the information relevant to the objective. It will be recalled that subjects encountered behavioral objectives on a page following the written passage and were not permitted to turn back the page and visually search for information. In the process of the backward mental review it was anticipated that students would mentally review information not relevant (incidental information) to the behavioral objective as well as information that was relevant to the objective. However, it was believed that the backward review process would not be as effective for remembering relevant information as would the forward shaping process engaged in by students in Treatment I.

Research Hypothesis Number Two.

2. Subjects receiving written behavioral objectives placed after passages within textual materials will exhibit significantly greater acquisition of incidental information than subjects receiving written behavioral objectives placed before passages within textual material.

As previously defined, textual information was identified as incidental if the information was not directly referenced to a written behavioral objective. Therefore, when a subject responded correctly to posttest questions not referenced to behavioral objectives (questions 19 through 36) his performance was evidence for acquisition of incidental information.

Support for hypothesis number two was dependent upon finding a significant difference ($p < .05$) between the means of experimental groups one and two on the incidental posttest questions. The statistical test of this hypothesis did not reveal a significant difference between these means. Therefore, hypothesis number two was not supported.

As previously mentioned it was anticipated that subjects who received behavioral objectives placed after a passage (Treatment II) would engage in a backward review process and mentally reflect on both incidental and relevant information. It was also believed that subjects who received objectives before the written passages would focus their attention on relevant information at the expense of disregarding incidental information.

Research Hypothesis Number Three.

3. Subjects receiving behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than incidental information.

Support for hypothesis number three was dependent upon finding a significant difference ($p < .05$) between the group means on relevant questions (1 through 18) and incidental questions (19 through 36). The statistical test of this hypothesis did not reveal a significant difference between these measures. Therefore, hypothesis number three was not supported.

For reasons explained in the discussion of hypotheses one and two it was anticpated that subjects in Treatment I would read the behavioral objective and then focus on or selectively perceive information relevant to the objective in the passage that followed. It was anticipated that in the process of focusing on relevant information, incidental material would receive less attention. Therefore subjects who received behavioral objectives placed before passages within the text material would recall more relevant information than incidental information in a test situation.

Research Hypothesis Number Four.

4. Subjects receiving written behavioral objectives placed before passages within textual materials will exhibit significantly greater acquisition of relevant information than subjects receiving all the written behavioral objectives placed before the complete textual materials.

Support for hypothesis number four was dependent upon finding a significant difference ($p < .05$) between the means of treatment groups one and three on relevant posttest question (1 - 18). The statistical test of this hypothesis did not reveal a significant difference between means. Therefore, hypothesis number four was not supported.

It will be recalled that subjects in Treatment Group III received the complete list of eighteen written objectives placed at the beginning of the textual material. It was anticipated that Treatment III subjects would read the entire list of objectives and subsequently focus on material relevant to the objectives as they read through the textual material.

The expected response of Treatment Group I subjects to the behavioral objectives placed before passages within textual material has been explained in the discussion of hypothesis number one. It was anticipated that subjects in Treatment Group I would recall more relevant information than subjects in Treatment Group III because of the differential memory load required by these treatments. Subjects in Treatment III were expected to focus on a relatively less amount of relevant information than subjects in Treatment Group I because it was thought they would forget a number of objectives after they were initially read. Subjects in Treatment III were not permitted to turn back pages and review the objectives after they had initially read the list. Correspondingly, subjects in Treatment Group I could potentially forget fewer objectives because they were interspersed throughout the textual material.

Research Hypothesis Number Five.

5. Subjects receiving the complete list of written behavioral objectives placed after the textual materials will exhibit significantly greater acquisition of incidental information than subjects receiving the complete list of behavioral objectives placed before the textual materials.

Support for hypothesis number five was dependent upon finding a significant difference ($p < .05$) between the means of experimental groups three and four on incidental questions (19-36). The statistical test of this hypothesis did not reveal a significant difference between these means. Therefore, hypothesis number five was not supported.

It was anticipated that subjects in Treatment Group III would focus their attention on material relevant to the objectives they could remember as they read through the textual material. In the process of focusing on the relevant material it was expected that incidental information would receive less attention. Correspondingly it was anticipated that subjects who received the complete list of objectives at the end of the textual material (Treatment Group IV) would not focus their attention more on one aspect of the textual material than another. Therefore incidental information would not be disregarded.

Research Hypothesis Number Six.

6. Subjects receiving written behavioral objectives placed before passages within textual material will exhibit significantly greater acquisition of relevant information than subjects receiving textual material without the written behavioral objectives (control group).

Support for hypothesis number six was dependent upon finding a significant difference ($p < .05$) between the means of treatment groups one (objectives within/before text material) and the control group (textual material without objectives) on relevant posttest questions (1-18). The statistical test of this hypothesis did not reveal a significant difference between these means. Therefore, hypothesis number six was not supported.

As previously discussed it was anticipated that subjects in Treatment Group I would be able to capitalize on the behavioral objectives treatment by focusing on relevant textual information and then exhibit the learning of that information by correctly answering relevant posttest questions. It was believed that Treatment I provided optimal conditions for students' advantageous utilization of objectives.

It was expected that subjects who did not receive behavioral objectives would not focus on any particular part of the textual material and therefore be relatively disadvantaged, compared to Treatment Group I subjects, when attempting to answer relevant posttest questions. Therefore, Treatment Group I subjects were expected to out perform the control group subjects (Experimental Group Five) on relevant posttest questions.

Aptitude x Treatment Interactions

The hypothesis for the expected aptitude x treatment interactions was stated as follows:

> There will be a differential relationship between criterion performances and aptitude of subjects, relative to the treatment received.

Support for this hypothesis was dependent on finding a significant F value for heterogeneity of regression when the aptitude variables (memory and vocabulary) and the criterion scores for relevant questions, incidental questions, and total test questions were separately compared. F tests for heterogeneity of regression were not significant, therefore the data indicated that aptitude x treatment interactions were not present.

It was anticipated that the student aptitude abilities would differentially interact with the variations on the behavioral objectives treatment. It was believed that the greater a person's vocabulary achievement the better that person would be able to take advantage of the behavioral objectives treatment. It was believed that students' memory aptitudes would differentially interact with the various behavioral objectives treatments because the treatments required differential memory loads.

Research hypotheses numbered one through seven have been presented and the results of the statistical tests to provide support or nonsupport for each hypothesis was given. In addition, a rationale for proposing each hypothesis was discussed. The rationales presented were based on a review of the literature and on information processing models conceptualized by Melton (1967) and Gagne (1974).

Discussion of Findings

Based on the literature reviewed, there was reason to expect that the treatments administered during this experiment may have resulted in significant effects as proposed in hypotheses one through six. Significant effects of the behavioral objectives treatment was not found. Why these results were obtained cannot be determined from the data collected. However, the following possibilities warrant serious consideration and study.

1. The objectives, rather than acting to focus students' attention on relevant information may have interfered with the attending efforts of both poor readers and good readers. It is possible

that for poor readers the objectives added to their reading load and therefore increased the difficulty of the materials. It is also possible that for the very good readers the objectives added structure not needed by good readers. Therefore, the reading comprehension of the good readers may have been impaired by the presence of objectives.

2. The nature of the textual materials may have been very stimulating for students who participated in the study. Therefore it is possible that all parts of the material were given equal attention regardless of the presence or placement of objectives within the textual materials.
3. The materials used in this study were designed to be representative of a chapter of textual material which a student would encounter in a social science or biological science text book. For this reason topic headings were included in the experimental reading materials. It is possible that topic headings acted in competition with the behavioral objectives. This would be the case if students attended to the topic headings and used them to guide their attention to specific parts of the textual materials.
4. The relevant posttest scores and incidental posttest scores were highly correlated (Appendix J). This could indicate that the relevant information and incidental information were closely related and/or interdependent. If this were the case, a student who focused on relevant information after reading an objective may have focused on incidental information inadvertently. In such a situation, the presence of objectives would not differ-

entially affect student performance on relevant and incidental posttest questions.

5. The textual material without objectives was 12 pages in length. A total of 18 objectives was added to this material. This resulted in a relatively high density of behavioral objectives within the textual material. It is possible that such a high density of objectives placed a cognitive overload on the students and actually inhibited their ability to process information.
6. Students may have been inattentive to the written objectives. This phenomenon may have occured for the following reasons.
    a. The brief training session on the use of objectives which was presented to students before the experiment began may have been inadequate. Failure to test the training program was a weakness of the design.
    b. The P. K. Laboratory School presents a relatively unstructured instructional program that purports to foster personalized learning styles. Students may have been inattentive to the objectives because they had learned from previous experience to rely on their personalized studying strategy. If this were true the students would not have attended to the objectives even if they understood the training orientation on the use of objectives.

As previously mentioned, aptitude x treatment interactions were not found.. If a particular aptitude interacts with a treatment, the treatment is probably an effective stimulus. If the treatment does not stimulate the learner in some way there is little chance that an aptitude possessed by that learner will assist or hinder the instructional treatment to affect achievement. It is believed that in this study objectives did not receive sufficient attention from students to produce an interactive effect.

Implications of Findings for Future Studies

A logical study that should be conducted as a result of this investigation is one in which students are properly trained to criterion in the utilization of behavioral objectives as a studying strategy before they participate in an experiment to assess the facilitative effects of objectives. These students could then be placed in an instructional system containing objectives and compared on achievement to students placed in an instructional system without objectives.

Another study that should be conducted as a result of this investigation is one in which students are required to make overt responses to behavioral objectives in written materials. Student overt responses could be the underlining of sentences they believed to be relevant to the objectives. The performance on an objectives referenced test of students who correctly identified textual information relevant to the objectives could be compared to: (1) the performance of students who made covert responses to the objectives and (2) to students who received no objectives.

Behavioral objectives may function as cues which prompt teachers to be more functional as they establish learning set, monitor and react to student responses, structure questions, provide closure, and sequence content. In short, the teacher who is aware of his goals is more likely to be businesslike and efficient in classroom transactions. If this is true, then the data as reported in the reviewed literature could be made consistent with the findings of this study in the sense that behavioral objectives may assist teachers who then provide attending assistance to students. This explanation would argue that for behavioral objectives to be effective they must trigger and shape teacher behavior variables and that it is these variables which are likely to influence student learning. Subsequent studies might stress the search for teaching changes as the dependent variable with the provision of behavioral objectives and training as the independent variables.

Summary

This investigation was designed to test the assumption that behavioral objectives placed in textual material act as effective stimuli to facilitate learning. Within the context of the design used, evidence that might be used to support the assumption was not found. While this finding was not anticipated, it is not totally contradictory to data reported by other researchers who have investigated behavioral objectives. Like many previous studies which reported findings similar to this study, it is possible that certain critical variables were not properly controlled. This possibility requires further examination.

APPENDICES

APPENDIX A

APTITUDE MEASURES

Name: ______________________

VOCABULARY TEST -- V-2

This is a test of your knowledge of word meanings. Look at the sample below. One of the five numbered words has the same meaning or nearly the same meaning as the word above the numbered words. Mark your answer by putting an X through the number in front of the word that you select.

jovial

1-refreshing
2-scare
3-thickset
4-wise
X-jolly

The answer to the sample item is number 5; therefore, an X has been put through number 5.

Your score will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 4 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

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Part 1 (4 minutes)

1. handicraft
    - 1-cunning
    - 2-fast boat
    - 3-utility
    - 4-manual skill
    - 5-guild
2. resistant
    - 1-confusing
    - 2-conjuctive
    - 3-systematic
    - 4-assisting
    - 5-opposing
3. ejection
    - 1-restoration
    - 2-expulsion
    - 3-reformation
    - 4-bisection
    - 5-exposition
4. yawl
    - 1-tropical storm
    - 2-foghorn
    - 3-carouse
    - 4-sailboat
    - 5-turn
5. listless
    - 1-aggressive
    - 2-adaptable
    - 3-indifferent
    - 4-sorrowful
    - 5-ugly
6. acceptable
    - 1-affected
    - 2-suitable
    - 3-attractive
    - 4-genial
    - 5-noteworthy
7. unobservant
    - 1-analytic
    - 2-conclusive
    - 3-heedless
    - 4-uninformed
    - 5-timid
8. perambulator
    - 1-coffeepot
    - 2-drunkard
    - 3-baby carriage
    - 4-liar
    - 5-camel
9. masticate
    - 1-chew
    - 2-massage
    - 3-manufacture
    - 4-create
    - 5-pollute
10. poignancy
    - 1-peignoir
    - 2-gloominess
    - 3-keenness
    - 4-gluttony
    - 5-barony
11. salaam
    - 1-salivation
    - 2-salmon
    - 3-salutation
    - 4-ransom
    - 5-brigand
12. compatible
    - 1-abridged
    - 2-congenial
    - 3-compelling
    - 4-related
    - 5-combined
13. inclement
    - 1-balmy
    - 2-happy
    - 3-righteous
    - 4-severe
    - 5-apprehensive
14. access
    - 1-abundance
    - 2-evaluation
    - 3-approach
    - 4-extreme
    - 5-foes
15. bland
    - 1-disagreeable
    - 2-pale
    - 3-soothing
    - 4-empty
    - 5-musical
16. collusion
    - 1-nerve
    - 2-rest
    - 3-prayer
    - 4-conspiracy
    - 5-disguise
17. degrade
    - 1-lower in rank
    - 2-bend downward
    - 3-disagree
    - 4-sort
    - 5-uplift
18. evolve
    - 1-develop gradually
    - 2-spin
    - 3-end suddenly
    - 4-implicate
    - 5-include

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

STOP.

Part 2 (4 minutes)

19. dreg

1-pulled
2-worthless leftover
3-wooden pin
4-wheel spoke
5-liquid

20. crescendo

1-repeat
2-treble clef
3-decrease in time
4-eighth note
5-increase in loudness

21. trilogy

1-set of four
2-a pair
3-vibrations
4-interjections
5-set of three

22. budget

1-civil government
2-capital punishment
3-calendar
4-bulletin
5-financial plan

23. gritty

1-frigid
2-windy
3-adhesive
4-granular
5-unwieldy

24. alignment

1-formation
2-accusation
3-emblem
4-brightness
5-buoyant

25. morbid

1-moral
2-attractive
3-gruesome
4-caustic
5-mysterious

26. malignant

1-deliberate
2-superior
3-delirious
4-malicious
5-fragrant

27. hauteur

1-discordancy
2-arrogance
3-languor
4-ignorance
5-utility

28. nihilism

1-psychology
2-optimism
3-anarchism
4-biology
5-chauvinism

29. insipid

1-benign
2-changeable
3-poisonous
4-colorless
5-tasteless

30. droll

1-serious
2-argument
3-dwarf
4-brogue
5-laughable

31. complacent

1-friendly
2-smug
3-jealous
4-angry
5-uncivil

32. archaeology

1-obsolete language
2-study of ancient cultures
3-architectural structure
4-lineage
5-study of rock formations

33. canvass

1-crack
2-flower
3-elect
4-wild bird
5-examine

34. correlate

1-ceremony of crowning
2-relate closely
3-distant relative
4-overweight
5-group of soldiers

35. edifice

1-small insect
2-heir
3-front
4-large building
5-learning

36. flabby

1-lacking firmness
2-giddy
3-talkative
4-noisy and boastful
5-affluent

DO NOT GO BACK TO PART 1 AND DO NOT GO ON TO ANY OTHER TEST UNTIL ASKED TO DO SO.

STOP.

Name: ______________________________

FIRST AND LAST NAMES TEST -- MA-3

This is a test of your ability to learn first and last names. In each part of the test you will study a page of 15 full names, first and last. After studying the page showing full names you will turn to a page showing a list of the last names in a different order. You will be asked to write the first names that go with each last name.

Here are some practice names. Study them until you are asked to turn to the next page (1 minute).

Janet Gregory

Thomas Adams

Roland Donaldson

Patricia Fletcher

Betty Bronson

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

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PRACTICE TEST PAGE

The first name in the list below has been completed. Write all of the other first names that you can remember.

______________________ Fletcher

______________________ Bronson

______________________ Donaldson

______________________ Gregory

______________________ Adams

Your score will be the number marked correctly. Even if you are not sure of the correct answer to a question, it will be to your advantage to guess.

There are two parts in this test. Each part has two pages:

> The first of these is a memory page which you are to study for 3 minutes.
>
> The second is a test page on which you are to write the first names that go with the last names. You will have 2 minutes to write.

When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

MEMORY PAGE FOR PART 1

Study this list. You will be allowed 3 minutes.

Claire Sullivan

Jack Thompson

Leon Chapin

John Reynolds

Joan White

Donald Lambert

Daniel Shaw

Kenneth Murray

Edward Nichols

Jean Wolfe

Carl Brown

Blanche Clark

Roger Lennon

Eloise Cooper

David Burgess

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

TEST PAGE FOR PART 1

Complete the names below. You have 2 minutes.

____________________ Nichols

____________________ Cooper

____________________ Murray

____________________ Chapin

____________________ Brown

____________________ Reynolds

____________________ Sullivan

____________________ Lennon

____________________ Lambert

____________________ Wolfe

____________________ Burgess

____________________ Shaw

____________________ Thompson

____________________ Clark

____________________ White

DO NOT TURN TO PART 2 UNTIL ASKED TO DO SO.

STOP.

MEMORY PAGE FOR PART 2

Study this list. You will be allowed 3 minutes.

Walter Price
Robert Sweeney
Leo Wells
Shirley Watson
Barbara Lombard
Joseph Hall
Edith Manning
Bruce Green
James O'Donnell
Irene Buchanan
Stella Page
Judy Shea
Priscilla Bardon
Stanley Rhodes
Susan Tracy

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

STOP.

TEST PAGE FOR PART 2

Complete the names below. You have 2 minutes.

____________________ Sweeney

____________________ Lombard

____________________ O'Donnell

____________________ Rhodes

____________________ Buchanan

____________________ Price

____________________ Watson

____________________ Page

____________________ Green

____________________ Tracy

____________________ Wells

____________________ Bardon

____________________ Manning

____________________ Shea

____________________ Hall

DO NOT GO BACK TO PART 1 AND

DO NOT GO ON TO ANY OTHER TEST UNTIL ASKED TO DO SO.

STOP.

APPENDIX B

BEHAVIORAL OBJECTIVES TRAINING MATERIALS

RATIONALE

As students pass from grade to grade and the difficulty and nature of their reading assignments change, it is necessary for subject area teachers to provide some instruction in specific reading skills related to their subject area. The purpose of Module 3 is to provide specific strategies for teaching the major reading skills in the subject areas. The major skills are: vocabulary, comprehension, study, and word identification.

The teaching strategies presented in Module 3 can be implemented as part of the daily instructional program. The suggestions do not require additional time but for the most part only a slight adjustment in present teaching procedures.

OBJECTIVES

Terminal Objective: The teacher will use various strategies for teaching the major subject area reading skills of: vocabulary, comprehension, study, and word identification.

Specific Objective 1. The teacher will write a single sentence description of six activities useful for clarifying word meaning in subject areas and arrange the activities along a continuum of specific association, functional understanding, and conceptual understanding.

Specific Objective 2. The teacher will list the instructional steps in the Introspective Comprehension Strategy and prepare an instructional plan designed to teach students a strategy for answering a specific type of question on a reading assignment.

Specific Objective 3. The teacher will identify those components which formulate the SQ3R study method and help students apply this study method to a current reading assignment in their textbook.

Life is tied to the soil or the water in which most plants grow. Soil is partly physical in its nature, and partly biological. The basis of soil is sand or clay, which consist of tiny rock particles. Various forms of erosion break down rocks to start the formation of soil.

The effective agents of erosion include plant structures, such as lichens and tree roots. If you peel a lichen from a boulder, you can see evidence of this erosion: gritty particles on the underside of the lichen, and pits left on the surface of the boulder.

Soil particles are small enough to hold considerable amounts of water on their surfaces, and to make the soil itself permeable. Air and water are therefore permanent parts of the soil. So are the minerals dissolved in the soil water.

Behavioral Objective: You will identify two permanent parts of the soil.

Question based on the objective:

Two permanent parts of the soil are ___________ and _____________.

Behavioral Objective: You will identify the effective agents of erosion.

Life is tied to the soil or the water in which most plants grow. Soil is partly physical in its nature, and partly biological. The basis of soil is sand or clay, which consist of tiny rock particles. Various forms of erosion break down rocks to start the formation of soil.

The effective agents of erosion include plant structures, such as lichens and tree roots. If you peel a lichen from a boulder, you can see evidence of this erosion: gritty particles on the underside of the lichen, and pits left on the surface of the boulder.

Soil particles are small enough to hold considerable amounts of water on their surfaces, and to make the soil itself permeable. Air and water are therefore permanent parts of the soil. So are the minerals dissolved in the soil water.

Question based on the objective:

The effective agents of erosion are:

(a) wind and water

(b) polluted air and water

(c) microbes

(d) plant structures and tree roots

Behavioral Objective -- A statement which describes what you will be able to do after you have received instruction.

Example: The student will list the five parts of speech.

Example: The student will be able to define ecology.

……

Behavioral Objective: You will identify the definition of the term "ecology".

No living thing can survive in complete isolation. All organisms, including man, live in communities, and depend heavily upon one another. Ecology is the branch of biology which studies this interdependence. Ecology can then be defined as the branch of biology which studies the relations of organisms with each other and with their environment.

To determine if you have now accomplished the above objective the following would be asked:

The branch of biology which studies the relations of organisms with each other and with their environment is called:

(a) Botany

(b) Population Education

(c) Ecology

(d) Geography

APPENDIX C

COMPLETE TEXTUAL MATERIALS WITHOUT OBJECTIVES

TO THE STUDENT:

READ THROUGH THE WRITTEN MATERIAL WHICH FOLLOWS AND LEARN EVERYTHING YOU CAN. YOU WILL BE GIVEN A TEST AT THE END OF THE UNIT ON THE MATERIAL YOU HAVE READ.

Contraceptive Education and Sexual Anatomy

Contraception, Sex, and You

Although some of our parents and friends are still reluctant to discuss sex and birth control, most of us realize that it is far more healthy to discuss and understand the roles of sex and contraception than to sweep them under the rug and have unwanted pregnancies. Don't be embarrassed to discuss these subjects with doctors, nurses, ministers, teachers, and other people who can provide you with information.

It is good to know the facts about sexuality and birth control, but because you acquire such information does not mean you are obligated to engage in sexual intercourse. However, if you should choose to engage in sexual intercourse you have the responsibility not to bring an unwanted child into the world. Every child should be planned for, loved, and cared for. No baby should be a "mistake" resulting from lack of knowledge about birth control or from uncontrolled passion.

How Sex Is Controlled In Humans

Sex is controlled in man and other mammals by an organ called the pituitary gland. This gland, the size of a pea in humans, is part of the brain. It gives off body chemicals called hormones: these, in turn, control most of the other hormone glands in the body. Hormones also control body growth, metabolism, and the sex glands or gonads.

The sex glands are called the testes in males and ovaries in females. Beginning with puberty, the pituitary hormones stimulate the maturation of the testes and ovaries. In turn, male sex hormones are secreted in the testes of boys and female sex hormones are produced in the ovaries of girls. The testes then produce sperm and the ovaries are stimulated to produce eggs. The male sex hormone is called testosterone. The female sex hormones are estrogen and progesterone. These hormones also control the secondary sex characteristics such as the amount of hair, the deepness of voice, and the size of hips and breasts.

The Male Reproductive System

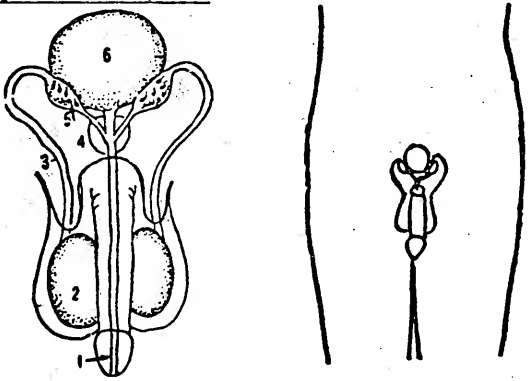


Figure 1.

Male reproductive anatomy.
(1) Penis
(2) Testicle (testis)
(3) Vas deferens (sperm duct)
(4) Prostrate gland
(5) Sperm in seminal vesicles
(6) Bladder

How Babies Are Made

Figure 1 shows a picture of the male sex organs, whose prime reproductive function is the production and delivery of sperm. Sperm are tiny cells too small to be seen except through a microscope. There are thousands of them in every drop of male fluid, called semen. Each sperm has a head and a tail and moves itself with a wriggling motion. These sperm are produced in a male's testes, which are located in the male sac, or scrotum. When the male sex organ, or penis, is stimulated, it becomes erect and can be inserted into the woman's birth canal, or vagina. During sexual intercourse, muscle contractions force hundreds of millions of sperm out through the penis and into the vagina.

The Female Reproductive System

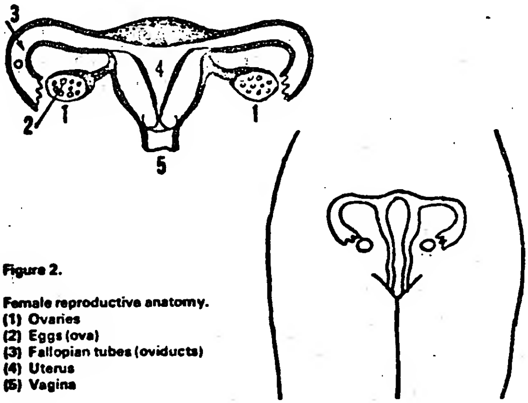
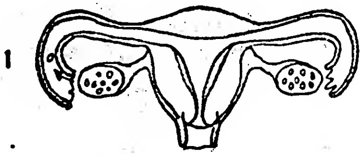


Figure 2.

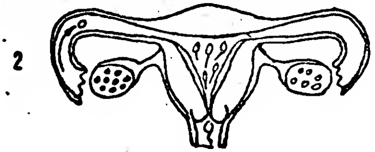
Female reproductive anatomy.
(1) Ovaries
(2) Eggs (ova)
(3) Fallopian tubes (oviducts)
(4) Uterus
(5) Vagina

The woman's ovaries produce one tiny egg every 28 days or so. This release of a mature egg by the ovary is called ovulation.

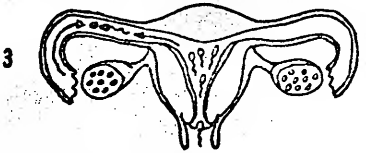
The egg travels down the oviduct. If one male sperm joins with this egg in the oviduct, fertilization occurs (figure 3). The egg begins to develop in the oviduct, multiplying from one cell to two cells and so on (figure 4). By the time the fertilized egg arrives in the womb, or uterus, it is ready to implant into the wall of the uterus. If the egg does implant (attach), it usually stays and grows for nine month into a baby. The baby then moves down through the vagina and is born.



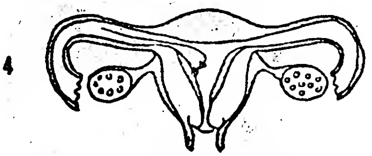
(1) Egg released from ovary into Fallopian tube



(2) Sperm enter uterus and move toward tube



(3) Sperm fertilizes egg in tube



(4) Fertilized egg implants in lining of uterus

Figure 3. Conception.

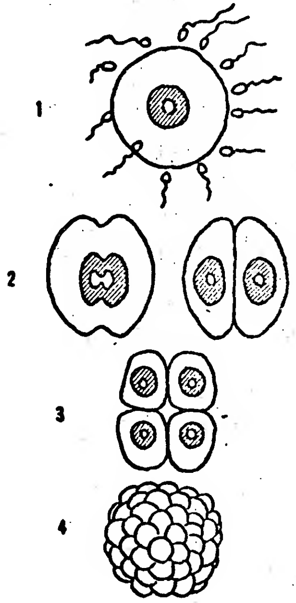


Figure 4. A fertilized egg grows into a multicellular embryo through cell division.

The Unfertilized Egg

If the egg cell is not fertilized by a sperm in the oviduct, it moves into the uterus, breaks apart and is absorbed or carried out of the body through the vagina. Part of the spongy lining of the uterus which was prepared to receive and nourish the egg cell is sloughed off each month if pregnancy does not occur; this is called the "period" of bleeding, or menstrual flow.

Contraception (Birth Control)

Planning Babies - Not A New Idea

The desire to control the number of children in a family is actually a very old idea. The three methods historically used to achieve this have been infanticide (killing a baby after birth), abortion (prevention after conception but before birth), and contraception (prevention before conception). Few societies use infanticide to control family size today and abortion is morally wrong in the minds of many people.

The Goal of Contraception

The goal of contraception is to keep the male sperm from fertilizing the female egg. There are many different kinds of contraceptive devices that help a couple prevent pregnancy, and these will be discussed.

Some methods of contraception are easier to use than others and have lower failure rates than others. There is no one ideal method for every couple. Expense, dependability, safety and convenience are all factors to consider.

******

Methods that work best	"Risky" methods	Methods that don't work
oral pill	Foam, cream	douche
IUD	suppositories	feminine spray
diaphragm & jelly	withdrawal	vaseline
condom & foam	rhythm	saran wrap
condom	lactation	having intercourse while standing up
		having intercourse during the "period"

Contraceptive Methods Obtained From Doctors and Clinics

This first group of methods includes those that require a pelvic examination and medical prescription. These are considered to be the most effective methods because they rarely fail. If is important to remember that any method is only as effective as its user. The oral pill and the intrauterine device (IUD) have the lowest failure rates.

Contraceptive Methods Obtained From Doctors and Clinics- Continued

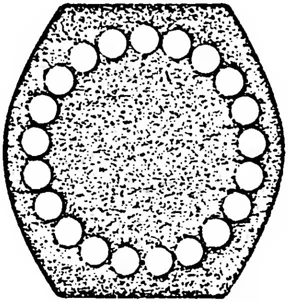
(1) Oral Contraceptives (birth control pills)

How Birth Control Pills Work

Birth control pills consist of the female hormones estrogen and progesterone, both of which exist naturally in humans and are given off by the ovaries. As long as a certain level of estrogen is maintained in the blood, the ovaries will not release any eggs. When a woman takes birth control pills every day, the estrogen of the pill maintains this level and prevents any egg from being released. There is no egg for the sperm to fertilize the egg; thus, the woman cannot become pregnant so long as the pills are taken correctly. This method, if followed according to directions, is almost 100% effective in preventing pregnancy.

How The Pill Is Taken

Woman taking Birth Control Pill



Birth Control Pills in Container

There are many different kinds of birth control pills. Therefore, the procedure for taking birth control pills may be different, depending on the type of pill a woman takes. Regardless of the type of birth control used it is important to understand that it is always the woman who takes the birth control pill and that the pill is placed in the mouth and swallowed (like taking an aspirin). Some birth control packs contain 21 pills and some contain 28 pills. It is important to understand a doctor's or nurse's directions on how to take the pill if a person chooses oral contraception as a birth control method. Usually, a pill is taken every day.

What If A Person Forgets To Take A Pill?

If a pill is forgotten, it should be taken as soon as it is remembered; and the next pill is taken at the regular time. If the pill is forgotten for more than 1 day, the woman should continue to take the pills for the remainder of that month, but should in addition use anothther method of birth control such as the condom and foam or a diaphragm (if the person got the diaphragm from a doctor).

The Pill and Possible Dangers

The possible dangers of the birth control pill is something which is presently being studied by the medical community. There are many arguments against using the birth control pill. Almost everything we do involves risks.

Doctors always obtain a thorough medical history from a woman prior to prescribing the Pill for her; and if her medical history indicates danger should she take the Pill, the doctor will suggest other methods. A Pap smear is also done prior to prescribing the Pill. A Pap smear is a sample of cells that is easily and painlessly taken by the doctor from the opening into the uterus (cervix). This sample tells the doctor if the patient has cells that appear to be abnormal or cancerous. If they do appear to be cancerous, the Pill is not prescribed and appropriate treatment is given.

The important point to remember is that pills should be taken only upon prescription by a doctor who will examine you and prescribe the correct pill. Do Not borrow pills from your sister or a friend or use their prescription.

The Pill and Side Effects

Various side effects occur in one woman out of ten -- such things as headaches, nausea, depression, weight loss or gain, breast tenderness. In most cases these side effects disappear after a woman has been taking the pill for two or three months. In any case, the doctor who prescribed the pill should be kept informed so that he or she can judge the proper course of action.

(2) Intra-Uterine Device (IUD)

What is the IUD?

An IUD is a small plastic device that comes in many shapes and sizes. A doctor inserts the IUD into the uterus. Two threads from the IUD hang down into the vagina, so the woman can feel them and know the device is in place.

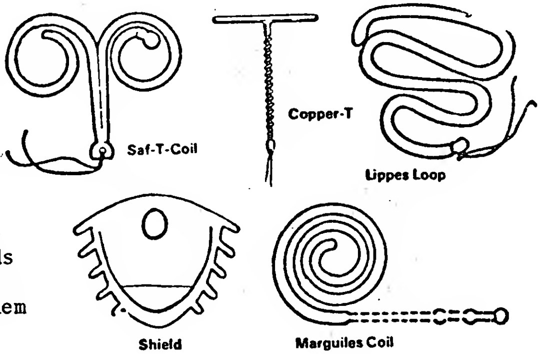
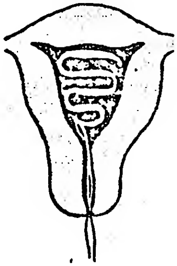


Figure 6. Different types of IUDs.

How the IUD Works



Three hypotheses exist regarding the mode of action of an IUD; (1) it may stimulate muscle contractions in the oviduct so that the egg arrives in the uterus before it reaches the stage when it can attach to the uterine wall; (2) it may irritate the uterine wall and prevent attachment of the egg; (3) it may inactivate the sperm or egg. All this is to say that the IUD may not prevent the sperm from fertilizing the egg in all situations. Therefore, the IUD is considered by some people to be very similar to an abortion.

IUD Insertion

The IUD is normally inserted during a menstrual period when the mouth of the uterus is more expanded than usual and when the doctor can be certain that the woman is not in the early stages of pregnancy. An IUD must be put in place by a doctor or someone under the supervision of a doctor.

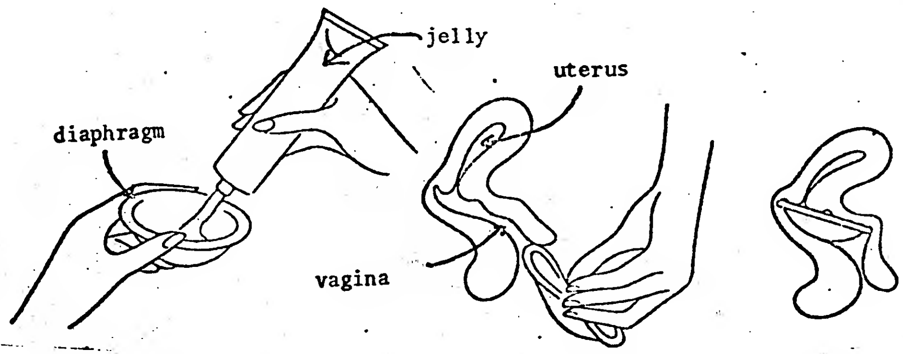
One problem with the IUD has been that it may be expelled during one of the early menstrual periods following insertion. This occurs in about 10% of all cases. When an expelled IUD is reinserted, it remains in half the cases. Another problem centers around cramping and heavy bleeding during menstrual periods. Women who experience this often find that the symptoms disappear within 6 months.

IUD Reliability

The IUD is about 97% effective, provided it stays in place. This means that the IUD is almost as effective as the Pill in women who have had children.

(3) Diaphragm With Contraceptive Cream or Jelly

The diaphragm is a flexible rubber cup that comes in varying sizes. It fits over the entrance of the uterus so that sperm are physically prevented from entering the uterus to fertilize the egg (figure 8). To be most effective the diaphragm is used with a sperm-killing jelly or cream. The cream or jelly should be liberally placed on the rim and within the cup a short time before having intercourse (not more than two hours). It should be left in place not less than six hours after sexual intercourse.



(1) Application of Spermicidal Jelly

(2) Diaphragm is bent and inserted into vagina

(3) Diaphragm in place

Insertion of a Diaphragm

Diaphragm Reliability

The diaphragm offers good protection (up to 95%) if properly fitted and used and not accidentally displaced during intercourse. It must be fitted by a doctor. The diaphragm may have to be refitted and replaced after childbirth or after an excessive weight gain or loss.

(4) Voluntary Sterilization

In both men and women sterilization is a surgical operation which involves closing off the tubes that carry either the sperm or the eggs. In men this procedure is called vasectomy and can be performed very simply in a doctor's office. In women the comparable procedure is called tubal ligation and requires a short stay in the hospital. In some clinics a tubal ligation can be performed through a scope inserted into the body cavity, without requiring admission to the hospital.

Who Should Consider Sterilization As A Means Of Birth Control?

Voluntary sterilization by surgery is the surest means of preventing conception. This method is perhaps the easiest and most dependable one for couples who desire no children or for couples who are sure that they have produced as many children as they want.

Sterilization cannot be considered reversible, so once it is done it should be considered a permanent condition. People who consider sterilization should consult with their doctor before a making such a decision.

Contraceptive Methods Obtained From Drugstores Without Prescriptions

(1) The Condom

A condom is a thin rubber or latex sheath that the man draws over his penis after erection and before intercourse. It catches the sperm as they leave his penis and keeps them from entering the woman's vagina.

Condom Reliability

The condom is effective if used correctly. Particular care must be taken during removal of the penis from the vagina after intercourse to assure that the condom does not slip off and spill any of its trapped semen into the woman's vagina. Also, condoms have been known to break during intercourse. For these reasons, the condom should be used in conjuction with foam which is inserted into the vagina by the woman. If the condom and "foam" are used together they are a very effective birth control method.

Two common practices sometimes lead to the deterioration of condoms and should be avoided: (1) the use of vaseline or any other petroleum jelly as lubricant when re-use of the condom is anticipated, and (2) carrying a condom around in a wallet or pocket for any length of time.

The Condom and Venereal Disease

The condom is the only contraceptive that helps to prevent Venereal Disease (VD). Venereal Disease is the general name of those diseases caused by organisms (germs) which are passed from infected persons to other persons either by sexual intercourse or by close body contact involving the sex organs, mouth and/or rectum.

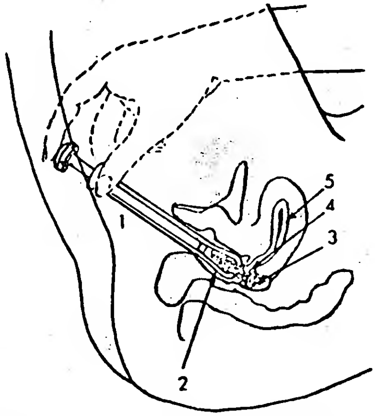
The most common is Syphilis, which in its first stage appears as a painless sore near the vagina or on the penis, lips, or around the rectum, is highly infectious, and heals in a few weeks. The second stage of Syphilis begins two to six months after the sore, and its symptoms can include skin rashes over all or part of the body, baldness, sore throat, fever and headaches. These will disappear without treatment, but the disease is still in the body and will create final problems such as crippling of the nervous system, insanity, heart disease and death.

Gonorrhea, the other common germ of Venereal Disease, appears in 3 to 5 days after contact and may show up in women as a vaginal discharge, and in a man may appear as a painful, burning sensation when urinating, and a discharge from the penis. However, there may be no symptoms at all. Gonorrhea affects the body by creating sterility, damage to sperm ducts or Fallopian tubes, blindness, a crippling form of arthritis, meningitis or heart disease.

(2) Contraceptive Foam

Foam is a chemical compound that is placed in the vagina with an applicator that comes with the foam when purchased. Instructions also come in the package. The foam acts as a barrier at the mouth of the uterus to prevent sperm from entering; it also acts as a sperm-killer.

(1) Applicator
(2) Vagina
(3) Foam
(4) Cervix
(5) Uterus



Insertion of Foam into the Vagina

Foam Reliability

Foam is only moderately effective. Insertion of the foam must be within an hour prior to intercourse. Each time the sex act is repeated, more foam must be inserted. Douching should be postponed for 6 hours after intercourse when using foam or its sperm-killing effect will be greatly decreased.

The condom or foam used separately is not a very good birth control method. However, when the condom and foam are used together they are very effective.

Two common brand names of foam include: Delfen and Emko.

(3) Vaginal Suppositories

Suppositories are small tablets which are taken from their wrappers and placed deep in the vagina 15 minutes to an hour before intercourse. A woman's bodily warmth melts the tablet to coat the vagina with a sperm killing film. They are not very reliable, but of course are better than nothing in preventing pregnancy.

Birth Control Methods That Require No Devices

(1) Coitus interruptus (Withdrawal)

When using this method, the couple proceeds with intercourse until almost the moment of ejaculation, when the male withdraws his penis so that the emmission of sperm takes place completely away from the vagina or external area.

How Reliable is Withdrawal?

This method has been responsible for many pregnancies because of a man's reluctance to draw back at the precise moment when his natural instinct is to lunge forward. Another problem is that some sperm may be discharged from the penis into the vagina without the male even being aware of it.

Using withdrawal as a birth control method is very risky.

(2) Rhythm

Pregnancy results from intercourse during ovulation, or a couple of days before or after ovulation. The rhythm method depends on the willingness and ability of a couple to limit sexual relations to the woman's safe period, which is any time of the month except during the time that a woman could possibly be producing eggs.

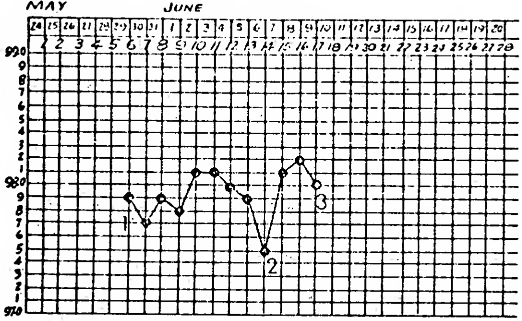


Figure 11. Temperature chart for rhythm method.
(1) Temperature readings begin when the "period" terminates
(2) Dip indicates onset of ovulation
(3) Safe period begins following three successive days of a temperature rise of at least .6°.

When Is the Safe Period?

The menstrual cycle of women (the day bleeding begins for one period until the day before bleeding begins for the next period) is usually 28 days long; and the day of ovulation usually occurs fourteen days before bleeding begins. However, there are wide variations in the length of the human cycle--21 to 35 days.

There are two ways to determine a woman's safe period. Neither of these methods will be discussed in detail because they are very complicated. One method of determining the safe period is based on the changes in a woman's body temperature. The chart above contains some information on this method. The second method of determining the safe period involves keeping a menstrual chart for one year.

Some new ways of determining the safe period have recently been developed and it is important that a person who chooses to use the rhythm method fully understands how to use it.

The Reliability of The Rhythm Method

Fifteen percent of all women have such wildly irregular periods that their "unsafe time" is hard to determine. Ovulation can occur at any time during the month--even during the last days of a period. Occasionally women with predictable cycles have an irregular one due to an emotional experience, such as a death in the family, or a fight with a boyfriend. Also, the menstrual irregularity of teenagers is well known. The typical teenager undergoes continual psychological, emotional, and biological changes, and it is quite normal for the menstrual cycle to vary widely. These facts suggest that the rhythm method imposes a great deal of uncertainty on those who use it.

(3) Lactation (Breast Feeding)

Some women rely on extended lactation, or breast feeding, as a means of avoiding pregnancy. This is a risky method and should not be used by people interested in efficient methods of birth control. Breast feeding can delay ovulation and resumption of menstruation for six months or so, and often for as much as a year. But frequently a new mother ovulates before her first period, which can occur as soon as a month after the birth of her baby. Therefore, pregnancy can result while still breast-feeding and prior to havings a period if a woman should ovulate before her first period.

What Are Some New Contraceptives Being Tested?

New Contraceptives being tested include:

1. Hormone capsules that are implanted under the skin.
2. Injectable hormones which can be injected every 3 months.
3. The Moring-After-Pill - this is a large does of estrogen (D.E.S. or diethylstilbestrol) given within 24 hours after possible fertilization in order to inhibit pregnancy.
4. Prostaglandins--hormones that can be given as tablets or injections. They can be used to regulate menstruation or to produce labor.

Methods 3 and 4 could be considered abortive and one should understand fully how they work before a decision is made to use one.

Please turn to the next page and begin taking the quiz which is based on the material you have read. Do not turn back to the text material to find answers.

APPENDIX D

TREATMENT I: SAMPLE OF MATERIALS

TO THE STUDENT:

READ THROUGH THE WRITTEN MATERIAL ON THE FOLLOWING PAGES. WITHIN THE MATERIAL YOU WILL FIND LEARNING OBJECTIVES (behavioral objectives). UPON COMPLETION OF THIS UNIT YOU SHOULD BE ABLE TO DEMONSTRATE YOUR MASTERY OF THE OBJECTIVES ON A WRITTEN TEST. IN OTHER WORDS THERE WILL BE TEST QUESTIONS WHICH MATCH THE OBJECTIVES. READ THE OBJECTIVES CAREFULLY.

Contraceptive Education and Sexual Anatomy

Contraception, Sex, and You

Although some of our parents and friends are still reluctant to discuss sex and birth control, most of us realize that it is far more healthy to discuss and understand the roles of sex and contraception than to sweep them under the rug and have unwanted pregnancies. Don't be embarrassed to discuss these subjects with doctors, nurses, ministers, teachers, and other people who can provide you with information.

It is good to know the facts about sexuality and birth control, but because you acquire such information does not mean you are obligated to engage in sexual intercourse. However, if you should choose to engage in sexual intercourse you have the responsibility not to bring an unwanted child into the world. Every child should be planned for, loved, and cared for. No baby should be a "mistake" resulting from lack of knowledge about birth control or from uncontrolled passion.

……

Behavioral Objective: You will identify where sex hormones are secreted in the female body and the male body.

……

How Sex Is Controlled In Humans

Sex is controlled in man and other mammals by an organ called the pituitary gland. This gland, the size of a pea in humans, is part of the brain. It gives off body chemicals called hormones; these, in turn, control most of the other hormone glands in the body. Hormones also control body growth, metabolism, and the sex glands or gonads.

The sex glands are called the testes in males and ovaries in females. Beginning with puberty, the pituitary hormones stimulate the maturation of the testes and ovaries. In turn, male sex hormones are secreted in the testes of boys and female sex hormones are produced in the ovaries of girls. The testes then produce sperm and the ovaries are stimulated to produce eggs. The male sex hormone is called testosterone. The female sex hormones are estrogen and progesterone. These hormones also control the secondary sex characteristics such as the amount of hair, the deepness of voice, and the size of hips and breasts.

……

Behavioral Objective: Presented with a picture of the male reproductive system you will identify the various parts.

……

The Male Reproductive System

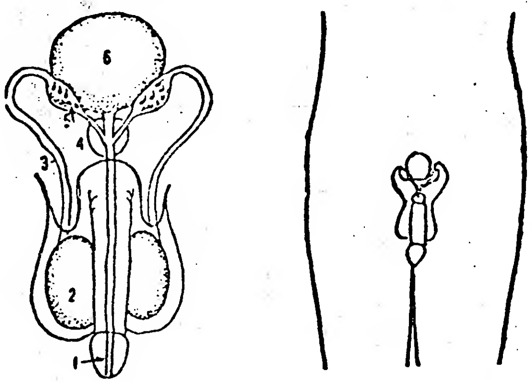


Figure 1.

Male reproductive anatomy.
(1) Penis
(2) Testicle (testis)
(3) Vas deferens (sperm duct)
(4) Prostrate gland
(5) Sperm in seminal vesicles
(6) Bladder

How Babies Are Made

Figure 1 shows a picture of the male sex organs, whose prime reproductive function is the production and delivery of sperm. Sperm are tiny cells too small to be seen except through a microscope. There are thousands of them in every drop of male fluid, called semen. Each sperm has a head and a tail and moves in a wriggling motion. These sperm are produced in a males's testes, which are located in the male sac, or scrotum. When the male sex organ, or penis, is stimulated, it becomes erect and can be inserted into the woman's birth canal, or vagina. During sexual intercourse, muscle contractions force hundreds of millions of sperm out through the penis and into the vagina.

……

Behavioral Objectives: Presented with a picture of the female reproductive system you will identify the various parts.

……

The Female Reproductive System

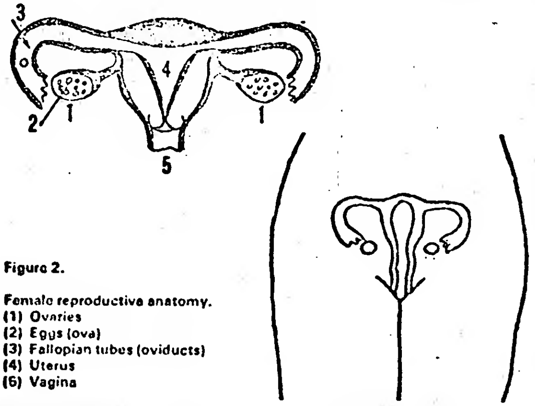


Figure 2.

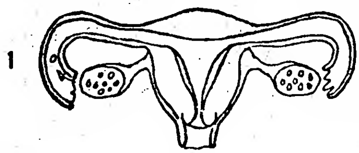
Female reproductive anatomy.
(1) Ovaries
(2) Eggs (ova)
(3) Fallopian tubes (oviducts)
(4) Uterus
(5) Vagina

Behavioral Objective: You will identify the definition of the term "ovulation."

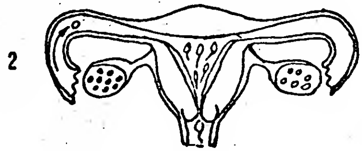
The woman's ovaries produce one tiny egg every 28 days or so. This release of a mature egg by the ovary is called ovulation.

Behavioral Objective: You will identify in which part of the body the sperm fertilizes the egg.

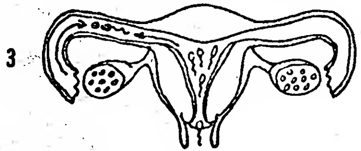
The egg travels down the oviduct. If one male sperm joins with this egg in the oviduct, fertilization occurs (figure 3). The egg begins to develop in the oviduct, multiplying from one cell to two cells and so on (figure 4). By the time the fertilized egg arrives in the womb, or uterus, it is ready to implant into the wall of the uterus. If the egg does implant (attach), it usually stays and grows for nine months into a baby. The baby then moves down through the vagina and is born.



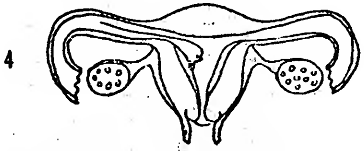
(1) Egg released from ovary into Fellopian tube



(2) Sperm enter uterus and move toward tube



(3) Sperm fertilizes egg in tube



(4) Fertilized egg implants in lining of uterus

Figure 3. Conception.

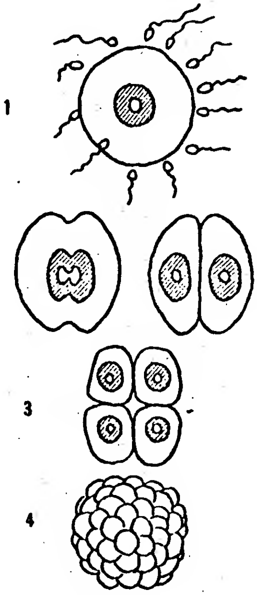


Figure 4. A fertilized egg grows into a multicellular embryo through cell division.

APPENDIX E

TREATMENT II: SAMPLE OF MATERIALS

TO THE STUDENT:

READ THROUGH THE WRITTEN MATERIAL ON THE FOLLOWING PAGES. WITHIN THE MATERIAL YOU WILL FIND LEARNING OBJECTIVES (behavioral objectives). UPON COMPLETION OF THIS UNIT YOU SHOULD BE ABLE TO DEMONSTRATE YOUR MASTERY OF THE OBJECTIVES ON A WRITTEN TEST. IN OTHER WORDS THERE WILL BE TEST QUESTIONS WHICH MATCH THE OBJECTIVES. READ THE OBJECTIVES CAREFULLY.

Contraceptive Education and Sexual Anatomy

Contraception, Sex, and You

Although some of our parents and friends are still reluctant to discuss sex and birth control, most of us realize that it is far more healthy to discuss and understand the roles of sex and contraception than to sweep them under the rug and have unwanted pregnancies. Don't be embarrassed to discuss these subjects with doctors, nurses, ministers, teachers, and other people who can provide you with information.

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How Sex Is Controlled In Humans

Sex is controlled in man and other mammals by an organ called the pituitary gland. This gland, the size of a pea in humans, is part of the brain. It gives off body chemicals called hormones; these, in turn, control most of the other hormone glands in the body. Hormones also control body growth, metabolism, and the sex glands or gonads.

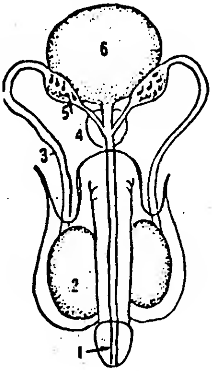
The sex glands are called the testes in males and ovaries in females. Beginning with puberty, the pituitary hormones stimulate the maturation of the testes and ovaries. In turn, male sex hormones are secreted in the testes of bodys and female sex hormones are produced in the ovaries of girls. The testes then produce sperm and the ovaries are stimulated to produce eggs. The male sex hormone is called testosterone. The female sex hormones are estrogen and progesterone. These hormones also control the secondary sex characteristics such as the amount of hair, the deepness of voice, and the size of hips and breasts.

....

Behavioral Objective: You will identify where sex hormones are secreted in the female body and the male body.

....

The Male Reproductive System



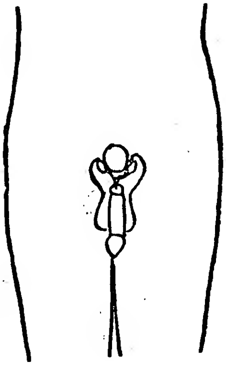


Figure 1.

Male reproductive anatomy.
(1) Penis
(2) Testicle (testis)
(3) Vas deferens (sperm duct)
(4) Prostrate gland
(5) Sperm in seminal vesicles
(6) Bladder

……

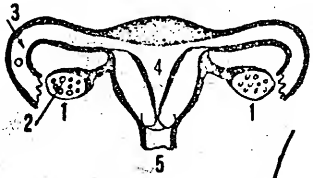
Behavioral Objective: Presented with a picture of the male reproductive system you will identify the various parts.

……

How Babies Are Made

Figure 1 shows a picture of the male sex organs, whose prime reproductive function is the production and delivery of sperm. Sperm are tiny cells too small to be seen except through a microscope. There are thousands of them in every drop of male fluid, called semen. Each sperm has a head and a tail and moves itself with a wriggling motion. These sperm are produced in a male's testes, which are located in the male sac, or scrotum. When the male sex organ, or penis, is stimulated, it becomes erect and can be inserted into the woman's birth canal, or vagina. During sexual intercourse, muscle contractions force hundreds of millions of sperm out through the penis and into the vagina.

The Female Reproductive System



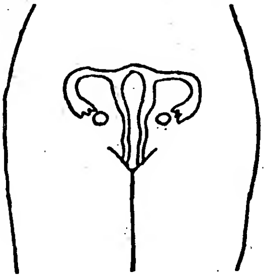


Figure 2.

Female reproductive anatomy.
(1) Ovaries
(2) Eggs (ova)
(3) Fallopian tubes (oviducts)
(4) Uterus
(5) Vagina

……

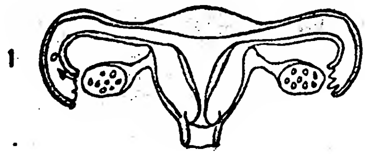
Behavioral Objective: Presented with a picture of the female reproductive system you will identify the various parts.

……

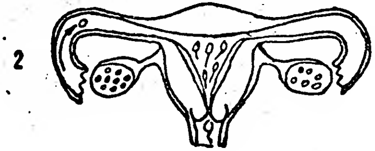
The woman's ovaries produce one tiny egg every 28 days or so. This release of a mature egg by the ovary is called ovulation.

Behavioral Objectives: You will identify the definition of the term "ovulation."

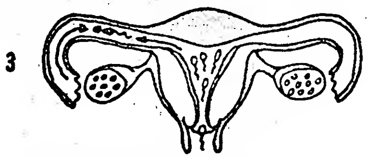
The egg travels down the oviduct. If one male sperm joins with this egg in the oviduct, fertilization occurs (figure 3). The egg begins to develop in the oviduct, multiplying from one cell to two cells and so on (figure 4). By the time the fertilized egg arrives in the womb, or uterus, it is ready to implant into the wall of the uterus. If the egg does implant (attach), it usually stays and grows for nine months into a baby. The baby then moves down through the vagina and is born.



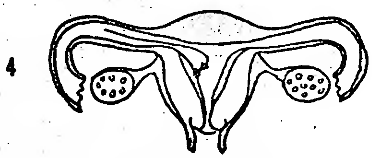
(1) Egg released from ovary into Fallopian tube



(2) Sperm enter uterus and move toward tube



(3) Sperm fertilizes egg in tube



(4) Fertilized egg implants in lining of uterus

Figure 3. Conception.

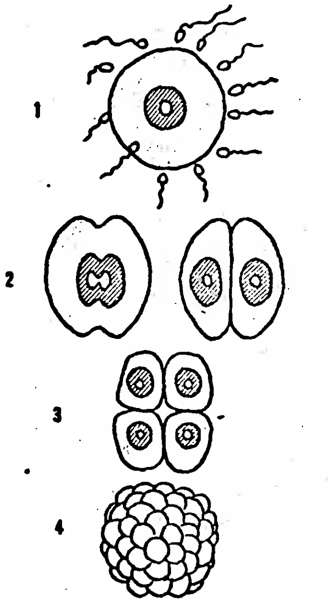


Figure 4. A fertilized egg grows into a multicellular embryo through cell division.

APPENDIX F

TREATMENT III: SAMPLE OF MATERIALS

TO THE STUDENT:

READ THROUGH THE WRITTEN MATERIAL ON THE FOLLOWING PAGES. AT THE BEGINNING OF THE UNIT YOU WILL FIND A LIST OF LEARNING OBJECTIVES (behavioral objectives). READ THE OBJECTIVES CAREFULLY. AFTER READING THE OBJECTIVES READ THROUGH THE UNIT. THEN TURN TO THE TEST AND DEOMONSTRATE YOUR MASTERY OF THE OBJECTIVES. IN OTHER WORDS THERE WILL BE TEST QUESTIONS WHICH MATCH THE OBJECTIVES.

To The Student:

Below, you will find a list of learning objectives. Upon completion of this unit you should be able to demonstrate your mastery of the objectives on a written test. Read The Learning Objectives (Behavioral Objectives) Carefully.

Behavioral Objectives:

1. You will identify where sex hormones are secreted in the female body and the male body.
2. Presented with a picture of the male reproductive system you will identify the various parts.
3. Presented with a picture of the female reproductive system you will identify the various parts.
4. You will identify the definition of the term "ovulation".
5. You will identify in which part of the body the sperm fertilizes the egg.
6. Given several methods of birth control, you will identify which method is classified as "risky".
7. Given several methods of birth control, you will identify which method is classified as one that does not work.
8. Given several methods of birth control, you will identify which method is considered most effective.
9. You will identify the possible physical side effects caused by the birth control pill.
10. You will identify the birth control method which acts to prevent an egg from attaching to the wall of the uterus.
11. Given pictures of several birth control methods, you will identify the method which does not prevent fertilization of the egg.
12. You will identify at what time the IUD is normally inserted.
13. You will identify the birth control method which acts as a physical barrier to sperm and is used with a cream or jelly.

CONTINUE READING THE OBJECTIVES ON THE NEXT PAGE

14. Given pictures of different birth control methods, you will identify the method which can be purchased without a prescription.

15. You will identify the chemical birth control method which provides a barrier over the entrance to the uterus and kills sperm.

16. You will identify the birth control method with which douching should be postponed for 6 hours after sexual intercourse.

17. You will identify the birth control method which is placed in the vagina and acts to kill sperm.

18. You will identify the name of the plan to not have sexual intercourse during the time a woman is ovulating.

PLEASE TURN THE PAGE AND READ THROUGH THE TEXTUAL MATERIAL.

Contraceptive Education and Sexual Anatomy

Contraception, Sex, and You

Although some of our parents and friends are still reluctant to discuss sex and birth control, most of us realize that it is far more healthy to discuss and understand the roles of sex and contraception than to sweep them under the rug and have unwanted pregnancies. Don't be embarrassed to discuss these subjects with doctors, nurses, ministers, teachers, and other people who can provide you with information.

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The sex glands are called the testes in males and ovaries in females. Beginning with puberty, the pituitary hormones stimulate the maturation of the testes and ovaries. In turn, male sex hormones are secreted in the testes of boys and female sex hormones are produced in the ovaries of girls. The testes then produce sperm and the ovaries are stimulated to produce eggs. The male sex hormone is called testosterone. The female sex hormones are estrogen and progesterone. These hormones also control the secondary sex characteristics such as the amount of hair, the deepness of voice, and the size of hips and breasts.

The Male Reproductive System

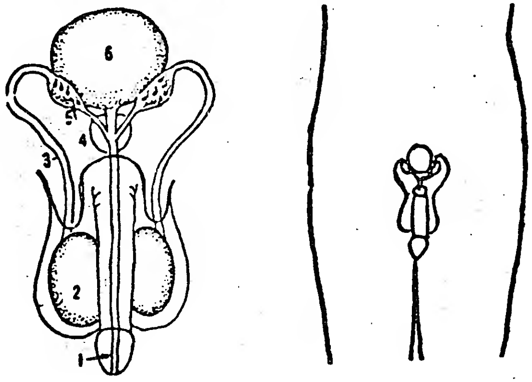


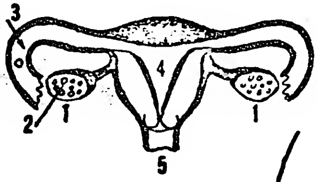
Figure 1.

Male reproductive anatomy.
(1) Penis
(2) Testicle (testis)
(3) Vas deferens (sperm duct)
(4) Prostrate gland
(5) Sperm in seminal vasicles
(6) Bladder

How Babies Are Made

Figure 1 shows a picture of the male sex organs, whose prime reproductive function is the production and delivery of sperm. Sperm are tiny cells too small to be seen except through a microscope. There are thousands of them in every drop of male fluid, called semen. Each sperm has a head and a tail and moves itself with a wriggling motion. These sperm are produced in a male's testes, which are located in the male sac, or scrotum. When the male sex organ, or penis, is stimulated, it becomes erect and can be inserted into the woman's birth canal, or vagina. During sexual intercourse, muscle contractions force hundreds of millions of sperm out through the penis and into the vagina.

The Female Reproductive System



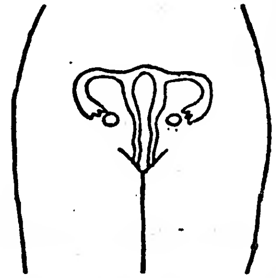
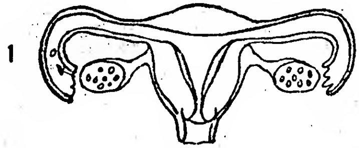


Figure 2.

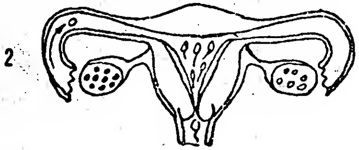
Female reproductive anatomy.
(1) Ovaries
(2) Eggs (ova)
(3) Fallopian tubes (oviducts)
(4) Uterus
(5) Vagina

The woman's ovaries produce one tiny egg every 28 days or so. This release of a mature egg by the ovary is called ovulation.

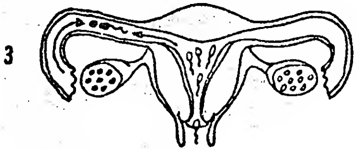
The egg travels down the oviduct. If one male sperm joins with this egg in the oviduct, fertilization occurs (figure 3). The egg begins to develop in the oviduct, multiplying from one cell to two cells and so on (figure 4). By the time the fertilized egg arrives in the womb, or uterus, it is ready to implant into the wall of the uterus. If the egg does implant (attach), it usually stays and grows for nine months into a baby. The baby then moves through the vagina and is born.



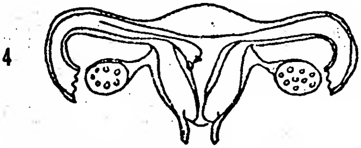
(1) Egg released from ovary into Fallopian tube



(2) Sperm enter uterus and move toward tube



(3) Sperm fertilizes egg in tube



(4) Fertilized egg implants in lining of uterus

Figure 3. Conception.

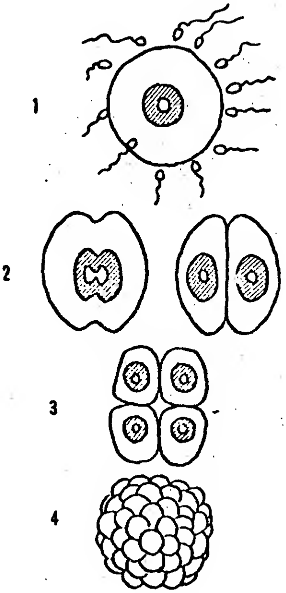


Figure 4. A fertilized egg grows into a multicellular embryo through cell division.

APPENDIX G

TREATMENT IV: SAMPLE OF MATERIALS

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* This page and the following page (p.122) constitute the first and last page of the reading material for students who participated in Treatment IV. The written behavioral objectives followed page 122.

even during the last days of a period. Occasionally women with predictable cycles have an irregular one due to an emotional experience, such as a death in the family, or a fight with a boyfriend. Also, the menstrual irregularity of teenagers is well known. The typical teenager undergoes continual psychological, emotional and biological changes, and it is quite normal for the menstrual cycle to vary widely. These facts suggest that the rhythm method imposes a great deal of uncertainty on those who use it.

(3) Lactation (Breast Feeding)

Some women rely on extended lactation, or breast feeding, as a means of avoiding pregnancy. This is a risky method and should not be used by people interested in efficient methods of birth control. Breast feeding can delay ovulation and resumption of menstruation for six months or so, and often for as much as a year. But frequently a new mother ovulates before her first period, which can occur as soon as a month after the birth of her baby. Therefore, pregnancy can result while still breast-feeding and prior to having a period if a woman should ovulate before her first period.

What Are Some New Contraceptives Being Tested?

New Contraceptives being tested include:

1. Hormone capsules that are implanted under the skin.
2. Injectable hormones which can be injected every 3 months.
3. The Morning-After-Pill - this is a large does of estrogen (D.E.S. or diethylstilbestrol) given within 24 hours after possible fertilization in order to inhibit pregnancy.
4. Prostaglandins--hormones that can be given as tablets or injections. They can be used to regulate menstruation or to produce labor.

Methods 3 and 4 could be considered abortive and one should understand fully how they work before a decision is made to use one.

To The Student:

Below, you will find a list of learning objectives. Upon completion of this unit you should be able to demonstrate your mastery of the objectives on a written test. Read The Learning Objectives (Behavioral Objectives) Carefully.

Behavioral Objectives:

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3. Presented with a picture of the female reproductive system you will identify the various parts.
4. You will identify the definition of the term "ovulation".
5. You will identify in which part of the body the sperm fertilizes the egg.
6. Given several methods of birth control, you will identify which method is classified as "risky".
7. Given several methods of birth control, you will identify which method is classified as one that does not work.
8. Given several methods of birth control, you will identify which method is considered most effective.
9. You will identify the possible physical side effects caused by the birth control pill.
10. You will identify the birth control method which acts to prevent an egg from attaching to the wall of the uterus.
11. Given pictures of several birth control methods, you will identify the method which does not prevent fertilization of the egg.
12. You will identify at what time the IUD is normally inserted.
13. You will identify the birth control method which acts as a physical barrier to sperm and is used with a cream or jelly.

CONTINUE READING THE OBJECTIVES ON THE NEXT PAGE

14. Given pictures of different birth control methods, you will identify the method which can be purchased without a prescription.

15. You will identify the chemical birth control method which provides a barrier over the entrance to the uterus and kills sperm.

16. You will identify the birth control method with which douching should be postponed for 6 hours after sexual intercourse.

17. You will identify the birth control method which is placed in the vagina and acts to kill sperm.

18. You will identify the name of the plan to not have sexual intercourse during the time a woman is ovulating.

APPENDIX H

POSTTEST OF RELEVANT AND INCIDENTAL INFORMATION

Multiple Choice Quiz

Directions:

Each question is followed by four choices. Read each question carefully and then choose the best answer. Please answer every question. Place the letter which corresponds to the answer you have chosen in the space provided beside each question.

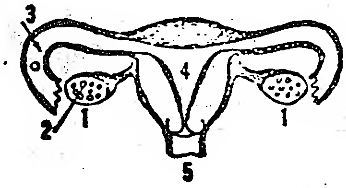
____ 1. What is the name of the organ which is labeled number 3 in the picture below?

a. ovary

b. oviduct

c. vagina

d. uterus



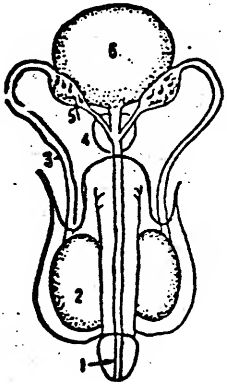
____ 2. What is the name of the organ which is labeled number 4 in the picture below?

a. seminal vesicle

b. vas deferens

c. prostate

d. uterus



____ 3. Which of the following birth control methods acts to prevent an egg from implanting (attaching) in the wall of the uterus?

a. diaphragm

b. IUD

c. pill

d. foam

____ 4. What is the name given to a plan to not have sexual intercourse during the time a woman is producing eggs?

a. lactation

b. rhythm

c. oral contraceptive

d. ovulation

____ 5. The release of a mature egg by the ovary is called:

a. fertilization

b. division

c. menstruation

d. ovulation

____ 6. What is a chemical birth control method which provides a barrier over the entrance to the uterus and acts to kill sperm cells?

a. IUD

b. foam

c. diaphragm

d. DES

____ 7. Which one of the following methods is considered a "risky" method of birth control?

a. vasectomy

b. condom

c. tubal ligation

d. foam

____ 8. Which one of the following acts as a physical barrier to sperm and is used with jelly or cream?

a. foam

b. diaphragm

c. IUD

d. condom

____ 9. Which one of the following procedures is considered to be one which does not prevent pregnancy?

a. rhythm

b. lactation

c. feminine spray

d. foam

____10. In which part of the body does the sperm fertilize the egg?

a. vagina

b. ovary

c. uterus

d. oviduct

____11. When is the IUD normally inserted?

a. directly after giving birth

b. during the menstrual cycle

c. during pregnancy

d. during ovulation

____12. In which body part are sex hormones produced?

a. oviducts and prostate gland

b. penis and uterus

c. egg and sperm

d. ovaries and testes

____13. A possible side effect of the birth control pill is a change in:

a. hair

b. weight

c. temperature

d. sex drive

____14. Which of the following methods of birth control is considered the most effective?

a. IUD

b. diaphragm

c. condom

d. rhythm

____15. With which one of the following methods should douching be postponed for 6 hours after intercourse?

a. withdrawal

b. foam

c. rhythm

d. IUD

____16. Which of the following is placed in the vagina and acts to kill sperm?

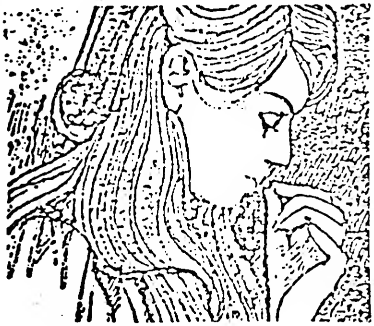
a. pill

b. IUD

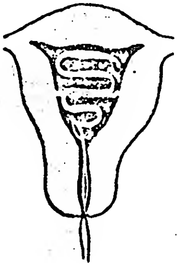
c. cervical cap

d. suppository

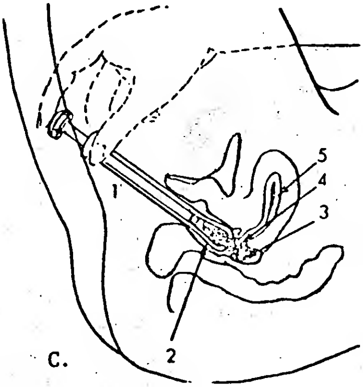
____17. Which picture below illustrates a method which does not prevent fertilization?



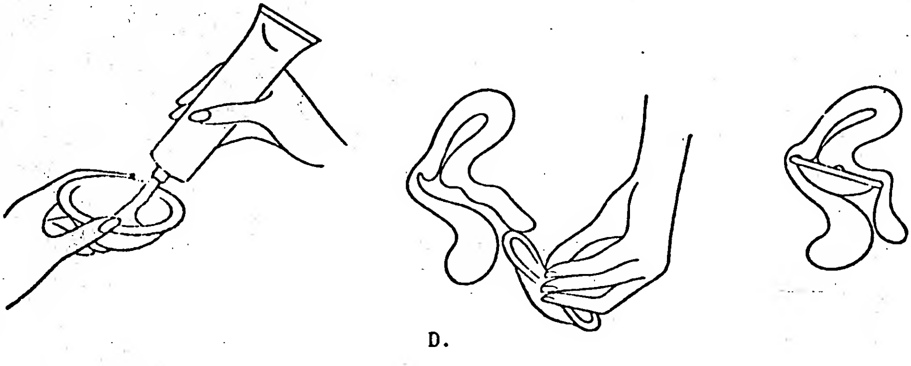
A.



B.

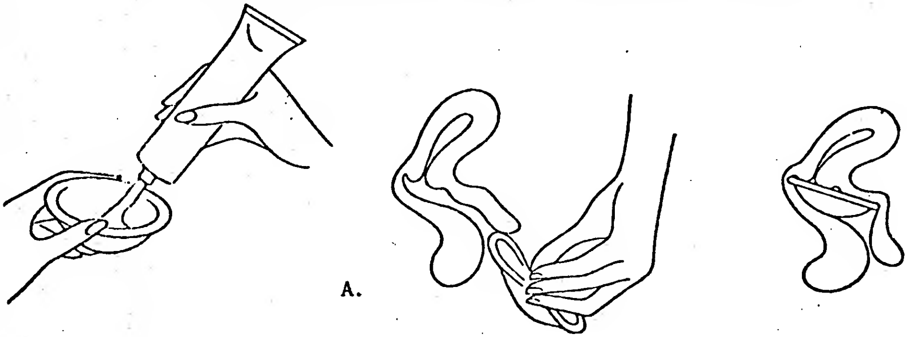


C.

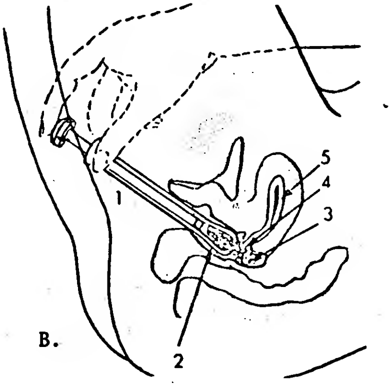


D.

____18. Which picture below illustrates the use of a birth control device which can be obtained without a prescription?



A.



B.

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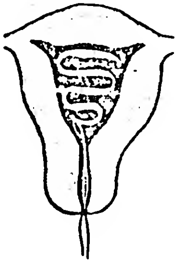

D.

____19. The pituitary gland is located in the :

a. neck

b. brain

c. prostate

d. uterus

____20. The male sex hormone is:

a. testosterone

b. progesterone

c. spermatogen

d. estrogen

____21. The organ within the female in which the baby develops is called the:

a. vagina

b. ovary

c. cervix

d. uterus

____22. Historically, three methods have been used to control family size. Which one of the following is not one of those methods?

a. contraception

b. peer pressure

c. infanticide

d. abortion

____23. Which one of the following birth control methods prevents the ovaries from releasing eggs?

a. IUD

b. rhythm

c. foam

d. pill

____24. Which one of the following statements is a true statement?

a. The birth control pill should not be taken at the same time a diaphragm is being used.

b. If a person forgets to take a birth control pill, three pills should be taken immediately.

c. Birth control pills cannot be taken when a woman is menstruating.

d. The birth control pill can be taken even when the condom and foam are being used.

____25. Which one of the following methods can be used only by females?

a. withdrawal

b. suppositories

c. rhythm

d. sterilization

____26. If an egg is not fertilized it:

a. is stored in the uterus

b. passes back to the ovary

c. is absorbed in the blood

d. passes through the vagina

____27. Which one of the following is "not" an example of an IUD?

a. Saf-T-Coil

b. Shield

c. Delfen-7

d. Lippes Loop

____28. A birth control device that may be expelled (come out) during a menstrual period is the:

a. IUD

b. pill

c. diaphragm

d. suppository

____29. Which of the following is considered a permanent form of birth control?

a. pill

b. IUD

c. tubal ligation

d. menstruation

____30. The only method of birth control that helps prevent Venereal Disease infection is:

a. foam

b. lactation

c. tubal ligation

d. the condom

____31. Which of the following may cause damage to the nervous system?

a. syphilis

b. abortion

c. Gonorrhea

d. pregnancy

____32. Which of the following may act as birth control because of the delay of the release of eggs?

a. pill

b. ovulation

c. rhythm

d. lactation

____33. Which birth control method is considered to have the least possible side effects?

a. pill

b. diaphragm

c. IUD

d. DES

____34. Which of the following is usually found in the birth control pill?

a. progesterone

b. testosterone

c. prostaglandin

d. diethylstilbestrol

____35. A Pap smear is a sample of cells taken from the:

a. uterus

b. cervix

c. vagina

d. ovaries

____36. Which of the following events normally indicates that a woman is ovulating?

a. dip in body temperature

b. nausea

c. bleeding

d. menstrual irregularity

APPENDIX I

RELIABILITY AND DIFFICULTY OF POSTTEST QUESTIONS

RELIABILITY AND DIFFICULTY OF POSTTEST QUESTIONS

Question	Difficulty	Reliability
1	.771	.476
2	.615	.395
3	.752	.360
4	.734	.519
5	.752	.572
6	.541	.286
7	.615	.268
8	.560	.286
9	.771	.154
10	.477	.458
11	.790	.388
12	.716	.412
13	.826	.208
14	.771	.335
15	.780	.589
16	.606	.655
17	.404	.270
18	.688	.651
19	.789	.521
20	.661	.380
21	.798	.661
22	.835	.330
23	.752	.423
24	.679	.442
25	.789	.524
26	.789	.490
27	.532	.371
28	.633	.639
29	.780	.495
30	.816	.531
31	.587	.386
32	.413	.379
33	.616	.522
34	.569	.476
35	.404	.323
36	.560	.476

APPENDIX J

INTERCORRELATIONS AMONG INDEPENDENT MEASURES
AND
DEPENDENT MEASURES

INTERCORRELATIONS AMONG INDEPENDENT MEASURES AND DEPENDENT MEASURES

Measures	1	2	3	4	5	N
1. Relevant Test Items	1.0000	0.7240	0.9315	0.4015	0.0613	110
2. Incidental Test Items	0.7240	1.0000	0.9099	0.4578	0.1018	110
3. Total Test	0.9315	0.9099	1.0000	0.4803	0.0868	110
4. Vocabulary Test	0.4015	0.4578	0.4803	1.0000	0.2949	110
5. Memory Test (First and Last Names Test)	0.0613	0.1018	0.0868	0.2949	1.0000	110

APPENDIX K

ABSTRACT OF BAKER (1976) STUDY

THE EFFECTS OF BEHAVIORAL OBJECTIVES ON STUDENT ACHIEVEMENT IN A COLLEGE LEVEL SEX EDUCATION INSTRUCTIONAL SYSTEM

(Abstract)

Problems and Purpose

A majority of studies which explore the achievement of students receiving behavioral objectives report no significant differences between treatment groups. However, when significance was found, it was usually in favor of the groups which received specifically written objectives. The major problems with many of these studies were improper experimental design and insufficient thought regarding the role of behavioral objectives as aids to learning in a variety of instructional contexts.

Consequently, it was the purpose of this study to empirically explore the facilitative effects of behavioral objectives presented to students prior to their reading a unit of material on sexual anatomy and birth control. A secondary purpose was to conduct the investigation in a framework free of the methodological problems which have plagued similar studies.

Research Hypothesis

1. Hr_1 - Subjects (Group I) receiving behavioral objectives prior to reading textual material on birth control will achieve a significantly higher criterion test score than will subjects (Group II) receiving the same text materials without objectives.

Experimental Design

For the purpose of this study the following experimental design was used:

Group 1	R	X_1	(Textual Material & Objectives)	0_1
Group 2	R	X_2	(Textual Material - No Objectives)	0_2
Group 3	R		Placebo (Unit on Margaret Sanger)	0_3

Subjects and Procedures

Sixty students from a community college in north central Florida enrolled in a freshman interdisciplinary science class, participated in this study. The number of males and females was approximately equal. The study was conducted in three separate one-hour sessions. Students were given one of three threatments which had previously been arranged in random order. Treatments included behavioral objectives and text, no-behavioral objectives and text, and a placebo. Students assigned to Treatment I received 14 specifically written behavioral objectives in addition to written and verbal instructions concerning their use. Treatment I students then read a unit on birth control and completed a 21 item multiple choice test based on the behavioral objectives. All groups took the same test. Treatment II students read the unit on birth control and completed the test but did not receive behavioral objectives. However, they did hear how objectives could be used during learning. Students assigned to Treatment III read a unit about Margaret Sanger, the birth control pioneer, heard how objectives could be used during learning and then took the criterion test. The Sanger unit did not contain information which overlapped with the birth control and sexual anatomy text.

Reliability and Data Collection

The criterion measure had twenty-one items and a Hoyt's reliability coefficient of .77 was computed for the test based on the responses of 60 subjects.

The group means and standard deviations for posttest scores are reported in table 1.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR POSTTESTS

Treatment Group	sd	m
		Posttest
Behavioral Objectives Group	3.833	16.20000
No-Behavioral Objectives Group	3.086	12.52381
Placebo	3.745	12.36842

Results and Interpretation of Data

A one-way analysis of variance revealed significant main effects when all groups were compared. A Scheffe test comparing pairs of mean scores showed that the behavioral objectives group (Treatment I) scored significantly higher on the criterion test than the no-behavioral objectives group and the placebo group (p .01) thus supporting hypothesis number one.

The Scheffe test did not reveal a significant difference between the no-behavioral objectives group (II) and the placebo group (III).

Discussion

It will be recalled that the present investigation was designed to assess the effects of behavioral objectives on student achievement while trying to control major contaminating factors in earlier studies. Students who received behavioral objectives in this study performed significantly better on a criterion test than students who did not receive objectives. It is assumed that students who received objectives were able to match information in the textual material with the objectives and therefore perform well on the behavioral objectives based criterion measure. While all groups received information on how to use the objectives, the treatment group combining this information with specific objectives was superior. One important implication of this study is that behavioral objectives can facilitate the learning of textual material when students are told what their function is and how to use them. These finding appear consistent with a large body of research called Mathemagenic research, pioneered by Rothkopf and Frase, at Bell Laboratories, on learning from text materials with written or pictorial adjuncts.

The structure and form of the textual material in the study was designed to be representative of text book material used in the average college classroom. Therefore, the effectiveness of existing texts in science may possibly be increased by the addition of behavioral objectives.

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BIOGRAPHICAL SKETCH

Shelton Dennis Baker was born in San Rafael, California, on November 28, 1945. He grew up in Bloomfield, Missouri, as the only child of his parents, Shelton and Vera Baker. He received his public elementary and secondary school education in the Stoddard County School district. Upon graduation from high school, he attended Southeast Missouri State College at Cape Girardeau, Missouri. At Southeast Missouri State his major was biology with an emphasis in chemistry. He received a Batchelor of Science in 1967.

Upon graduation from college he joined the United States Navy. In the Navy he continued his education as a recipient of training in Navy schools which included: (a) Machinist Mate School, (b) Nuclear Power School, (c) Submarine Prototype Training, and (d) Naval Flight School.

Upon completion of his military duties, he entered the teaching profession. His first teaching assignment was at Pace Junior High School in Pace, Florida, as an instructor of geography, English, and science. In the year that followed he taught physical science at the 7th, 8th, and 9th grade levels.

His doctorate education began at the University of Florida at Gainesville, where he met Dr. John J. Koran, Jr.. As an assistant of Dr. Koran's it was possible for Mr. Baker to acquire valuable teaching experience at the university level in the areas of elementary and secondary science education for preservice teachers. He has also taught in the University departments of Electrical Engineering and Physical Health and Recreation.

Mr. Baker has a firm commitment to the improvement of science education. He is a member of several professional educational organizations including The American Educational Research Association and The National Association of Biology Teachers. He has also presented and published papers on science education, one of which included the presentation of a paper at the Annual Convention of the National Association for Research in Science Teaching, San Francisco, California, April 1976.

In addition to being a productive and dedicated member of the academic community, Mr. Baker is also an active member of local community organizations. He is presently the Education Director for Planned Parenthood of North Central Florida, an organization which he helped establish. He has also served as president of Gainesville Zero Population Growth and remains an active member of that organization.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

John J Koran Jr
John J. Koran, Jr., Chairman
Professor of Curriculum and
Instruction

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James D. Casteel
James D. Casteel
Professor of Curriculum and
Instruction

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Thomas C. Emmel
Thomas C. Emmel
Professor of Zoology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation of the degree of Doctor of Philosophy.

Vynce A. Hines
Vynce A. Hines
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to accepatble standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Dean of the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December, 1976

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